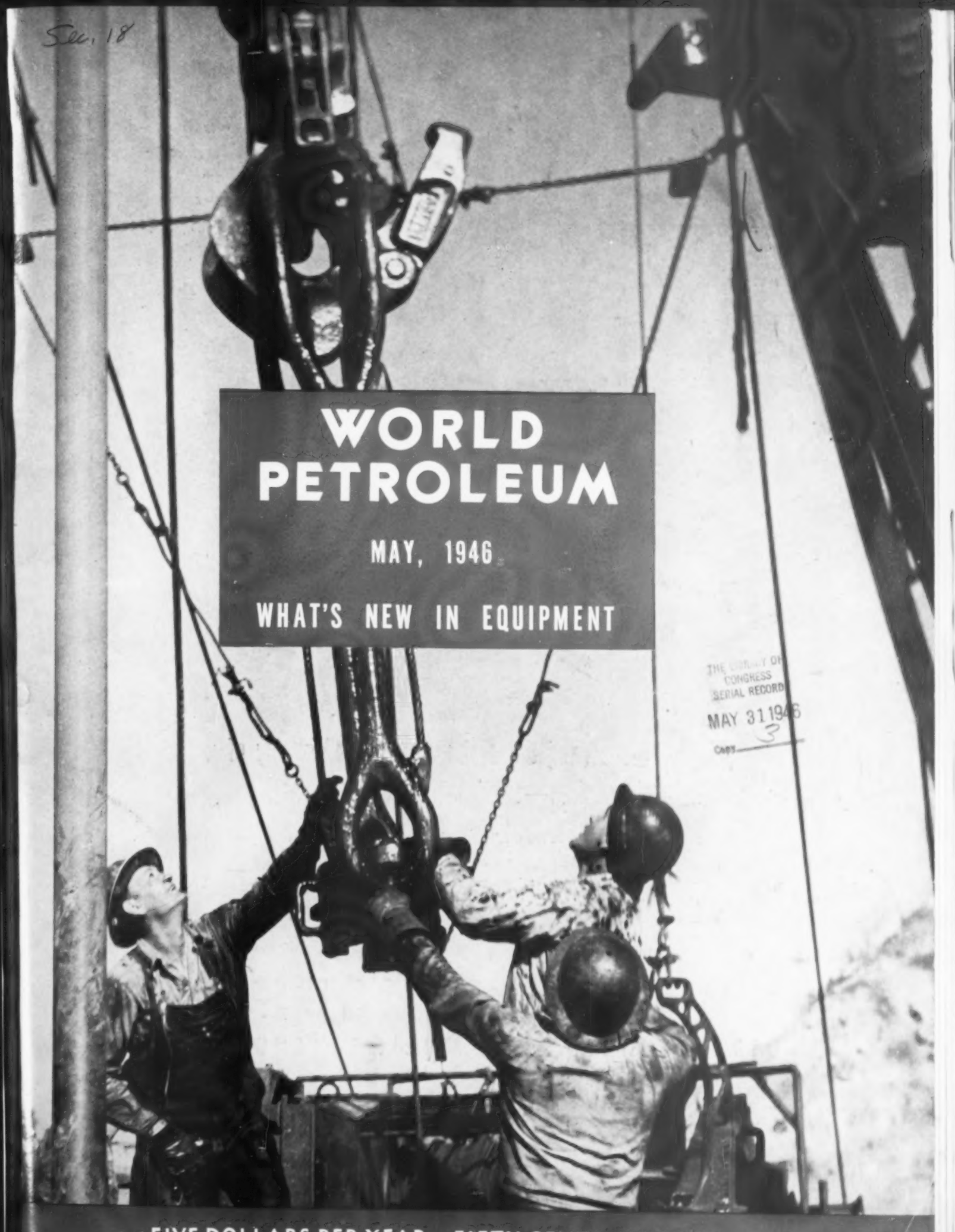
Sec. 18



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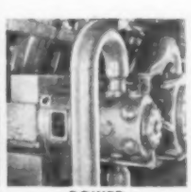
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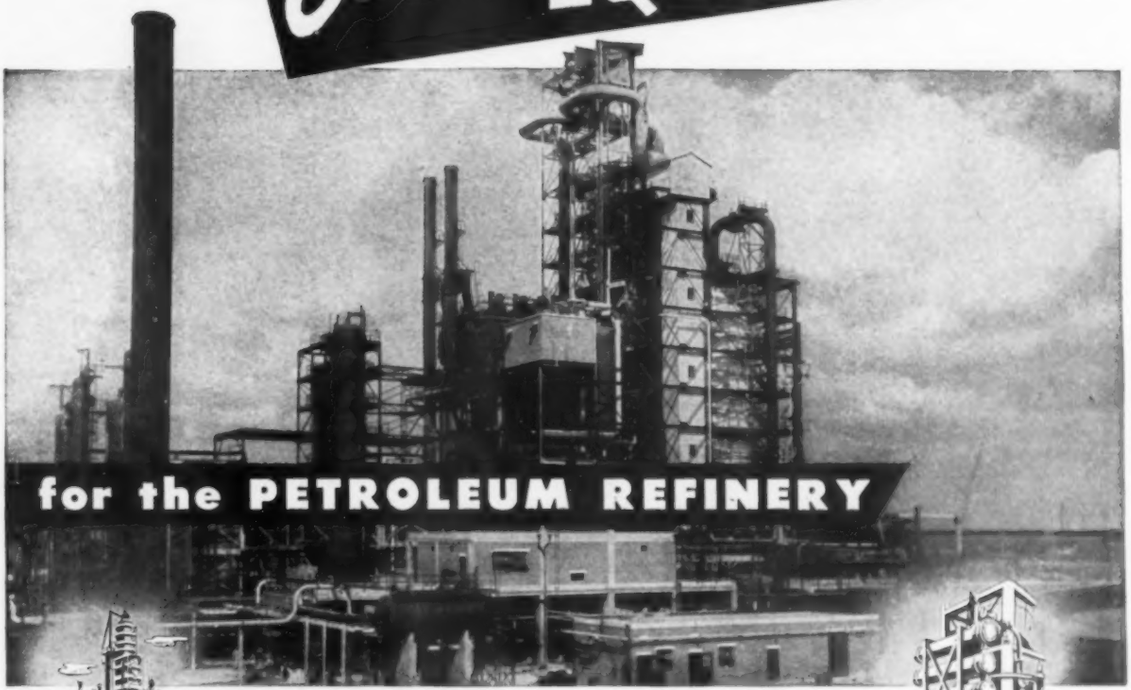

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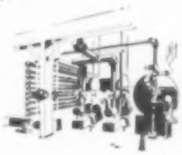

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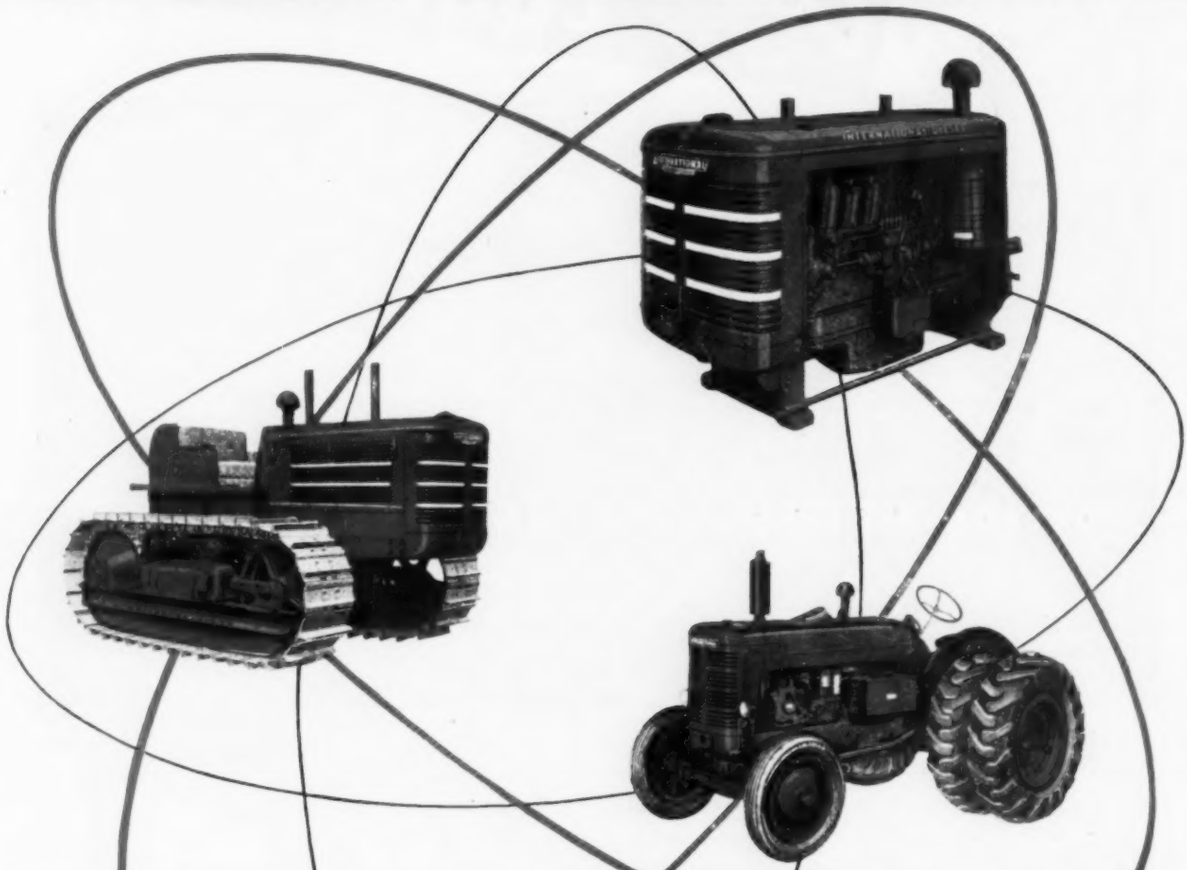

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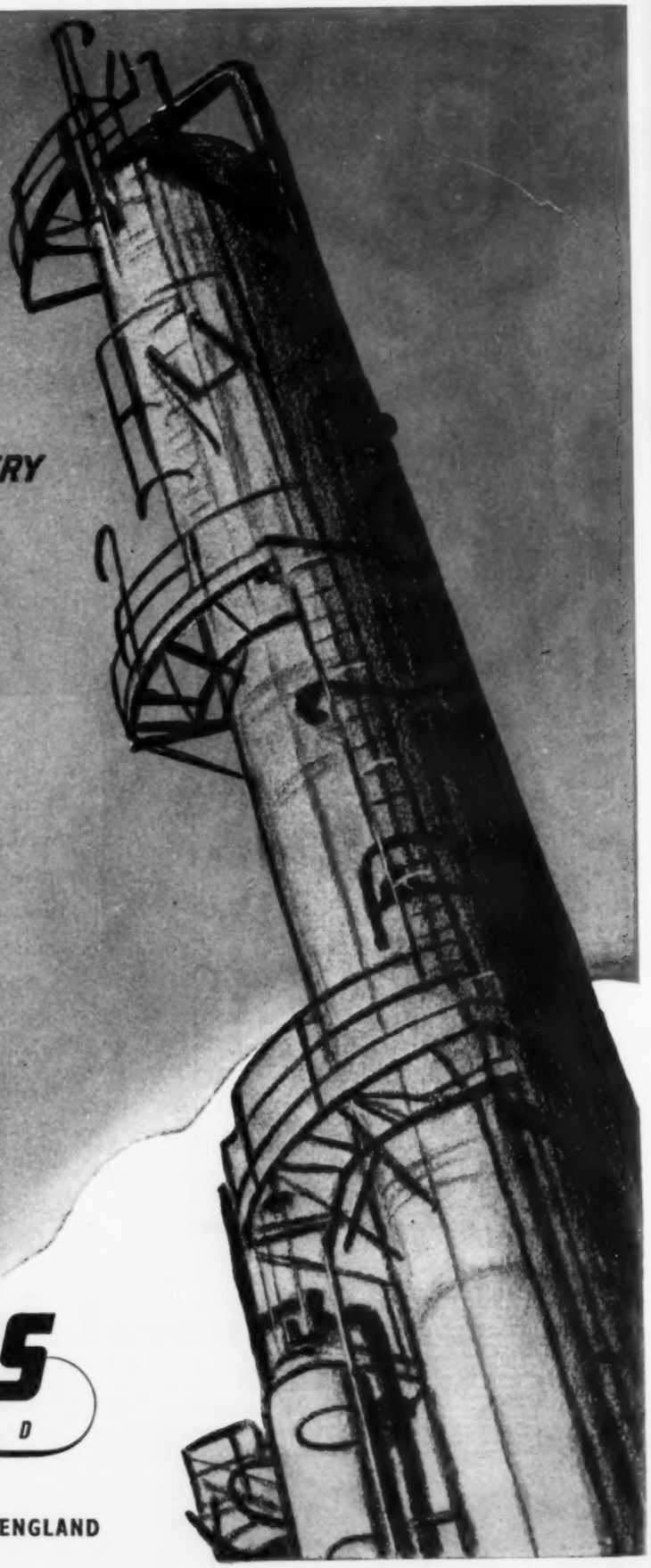

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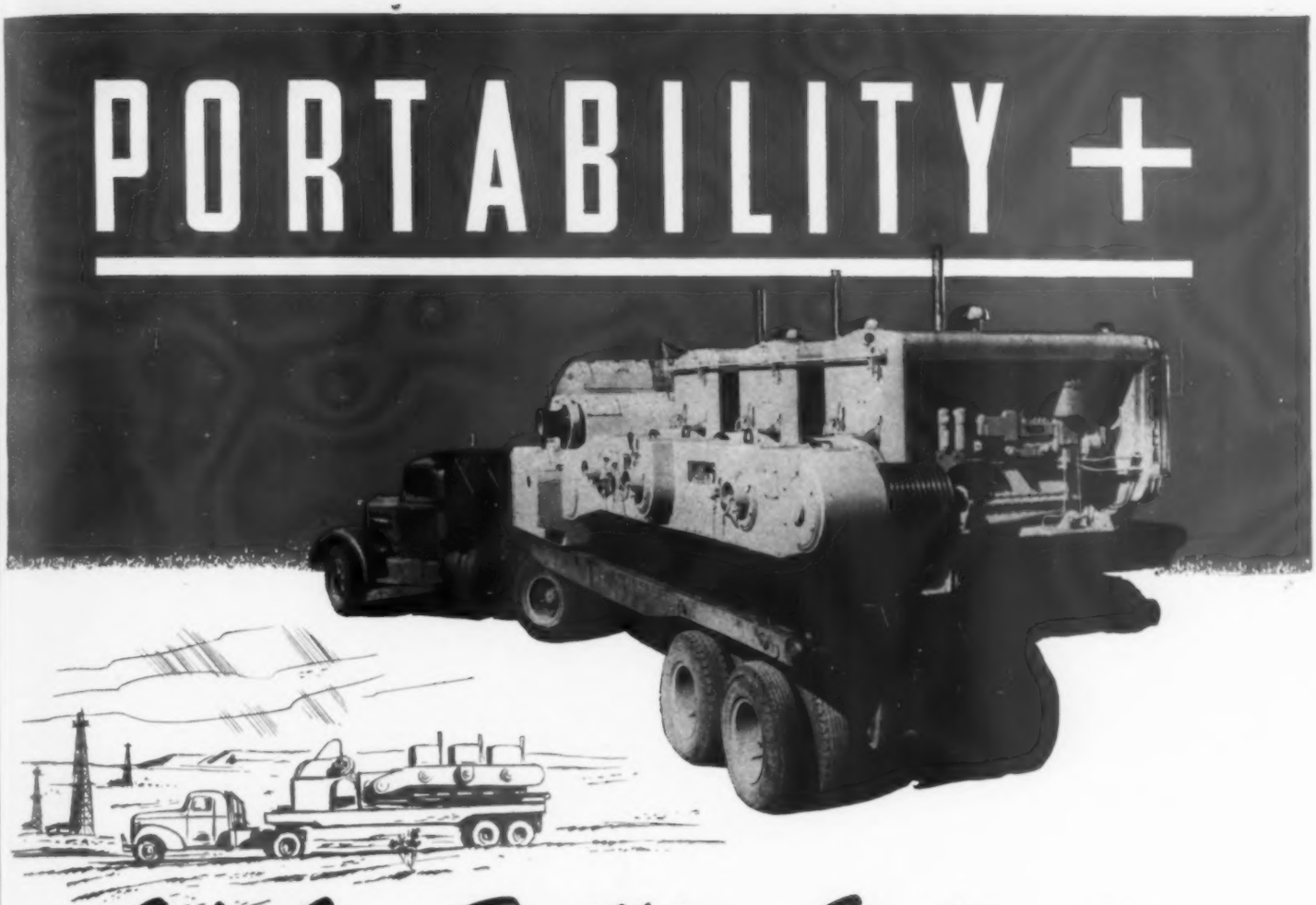

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Write for Bulletin BU 60 which describes all of the features of Model U-15 in detail.

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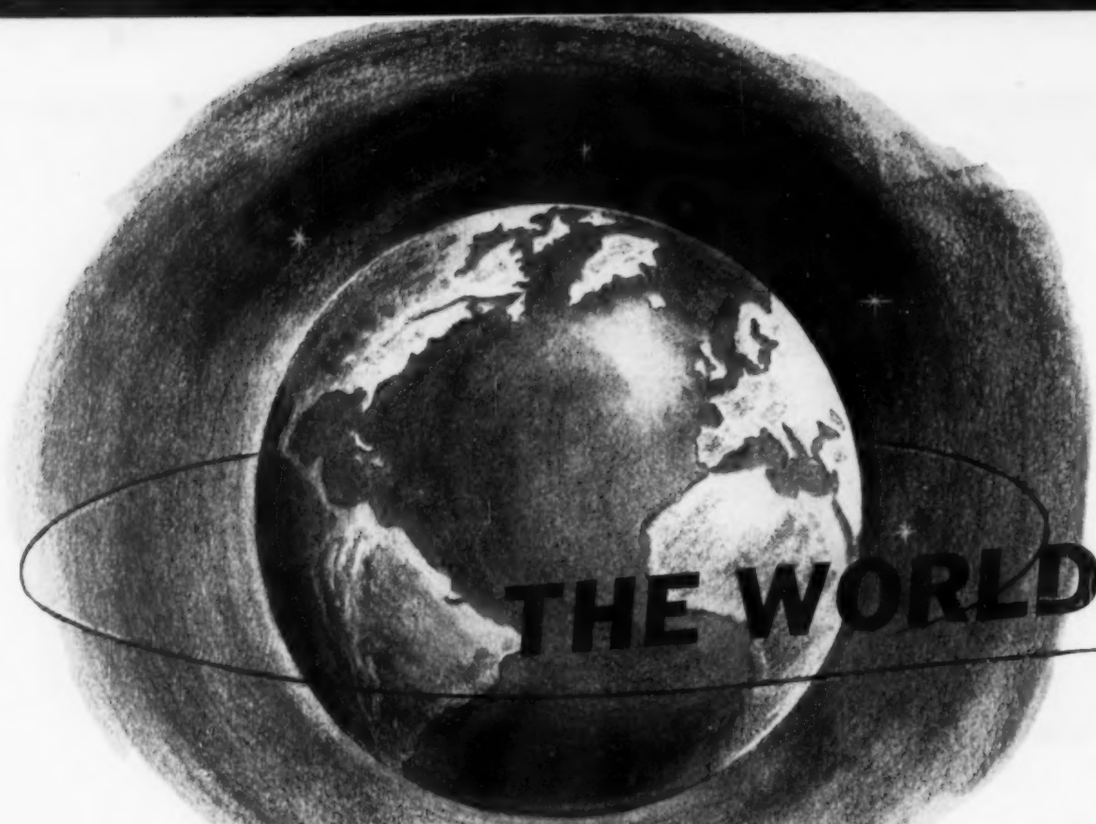
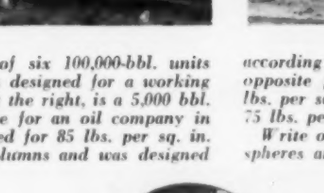


The Hortonspheroid shown above is one of six 100,000-bbl. units located at a refinery in the West Indies. It is designed for a working pressure of 2½ lb. per sq. in. Shown above, at the right, is a 5,000 bbl. Hortonsphere, one of two used to store butane for an oil company in Oklahoma. It is 38 ft. in diam. and is designed for 85 lbs. per sq. in. pressure. This Hortonsphere has cylindrical columns and was designed according to API-ASME specifications. The view at the top of the opposite page shows two 2,500 bbl. Hortonspheroids designed for 15 lbs. per sq. in. pressure and four 1,500 bbl. Hortonspheres designed for 75 lbs. per sq. in. working pressure.

Write our nearest office for quotations or complete details on Hortonspheres and Hortonspheroids.



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. . . are the answer to the petroleum industry's need for pressure storage tanks to store volatile oil products. A few of the advantages of Hortonspheres and Hortonspheroid and the products for which they are recommended — are listed below.

HORTONSPHERES . . . these spherical pressure storage tanks are recommended for volatile liquids requiring pressures from 25 to 100 lbs. per sq. in. Some of the products efficiently stored in Hortonspheres include the more volatile grades of natural gasoline, butane, butane-propane mixtures and volatile refinery charging stocks. Hortonspheres reduce fire hazard, cut down maintenance costs, minimize corrosion and provide an effective means of preventing evaporation.

HORTONSPHEROIDS . . . are large capacity pressure storage tanks that are used by the petroleum industry to store hydrocarbons ranging in volatility from motor gasoline to natural gasoline. They are effective in preventing many types of evaporation losses.

Hortonspheroids are dependable, they have no moving parts to get out of order and they are efficient under all climatic conditions. No power is required to operate them and, like Hortonspheres, they also reduce fire hazard to a minimum.

Standard Capacity Hortonspheres

Designed in accordance with API-ASME Specifications

(Capacity in Bbls. 42 U.S. Gals.)	Diam. in Ft. and In.	Pressure in Lbs. per Sq. In.
1,000	22′ 3″	40 — 200
1,475	25′ 3″	30 — 150
2,000	28′ 0″	30 — 150
2,530	30′ 3″	30 — 150
5,000	38′ 0″	30 — 100
6,000	40′ 6″	30 — 100
7,500	43′ 3″	30 — 100
10,000	48′ 0″	30 — 75
12,000	51′ 0″	30 — 75
15,000	54′ 9″	20 — 60
20,000	60′ 6″	10 — 50
25,000	65′ 0″	10 — 40

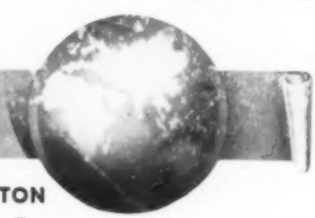
Table of Standard Capacity Hortonspheroid . . .

Indicating type of Hortonspheroid furnished for various pressures.

CAPACITY IN BBLS.	WORKING PRESSURE LBS. PER SQ. IN. 2½	5	10	15	20	25	30
2,500	H	S	S	S	S	S	S
5,000	H	S	S	S	S	S	S
7,500	H	S	S	S	S	S	S
10,000	H	S	S	S	S	S	S
15,000	H	S	S	S	S	S	S
20,000	H	N	N	N*	N*	S	S
25,000	H	N	N	N	N*	S	S
30,000	H	N	N	N	N	S	S
40,000	N	N	N	N	N	S	S
50,000	N	N	N	N	N		
60,000	N	N	N	N	N		
80,000	N	N	N	N	N		
100,000	N	N	N	N	N		
120,000	N	N	N	N	N		

S—Plain type Horton-spheroid
N—Noded type Hortonspheroid
H—Hemispheroid Furnished

*Smooth type is furnished if soil permits. Intermediate sizes and pressures can be furnished if desired.



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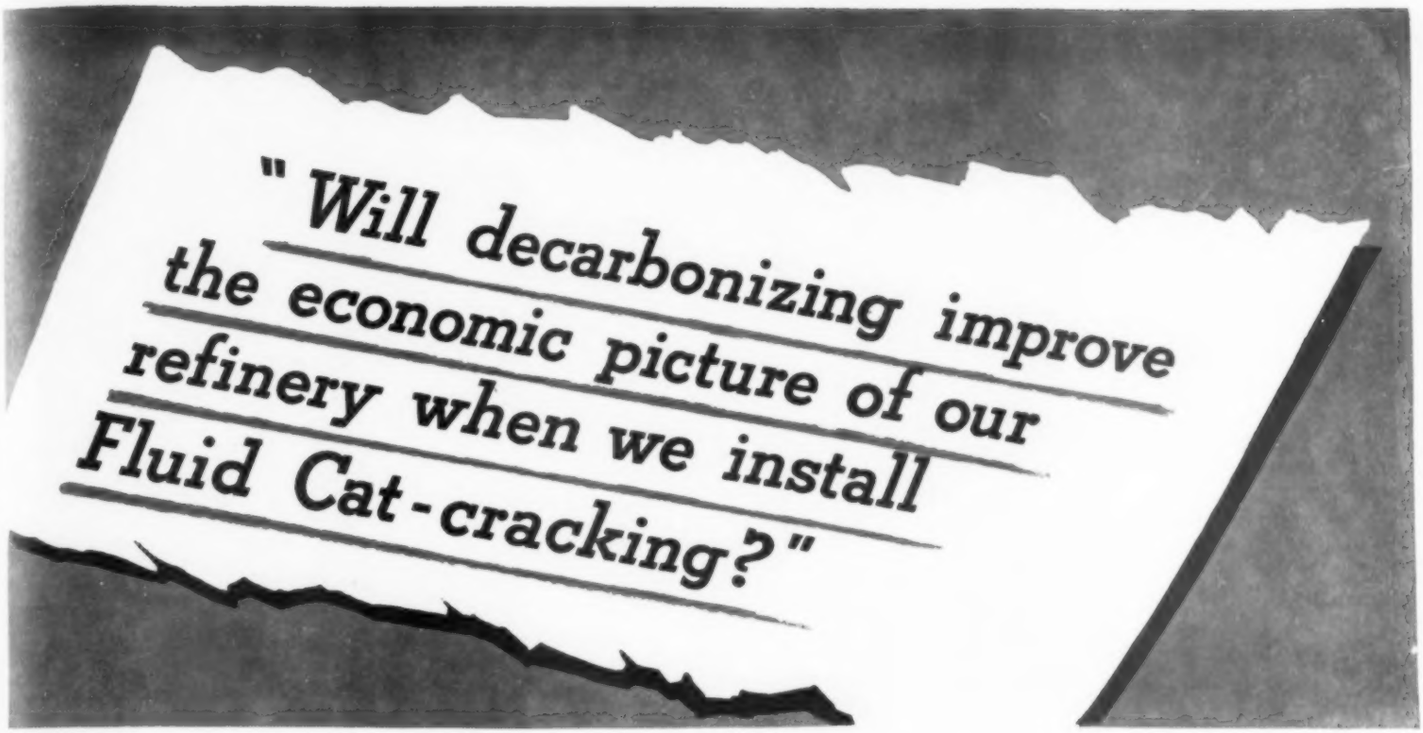
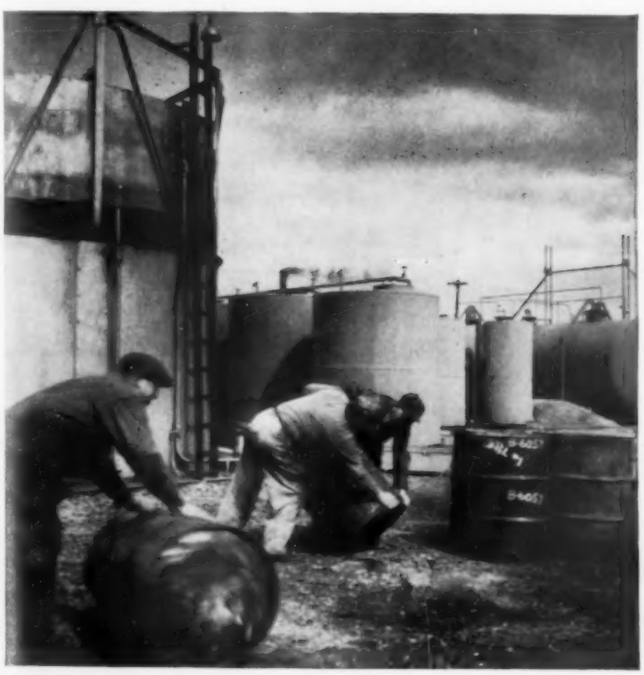


Refiners across the country must repeatedly find positive answers to such questions as this, on which depend major decisions. To provide sound, accurate answers, Kellogg years ago set up a system which has paid off for refiners. To understand its thoroughness ... and why it has received such wide acceptance ... it is only necessary to read through the following step-by-step sequence.



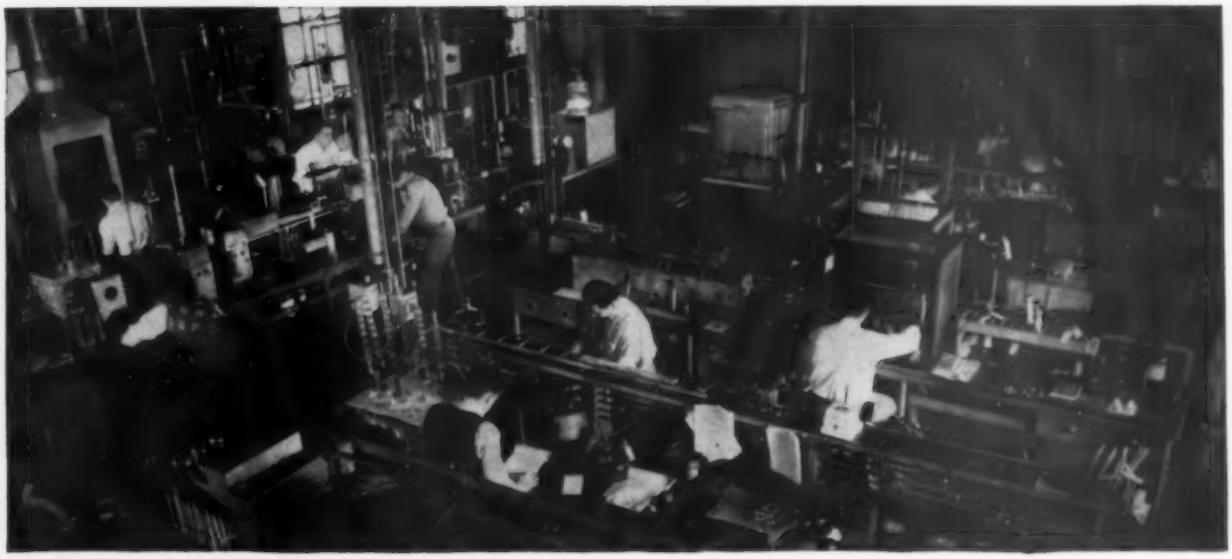
1 FIRST STEP ... the Kellogg yard ... arrival of samples of the refiner's present crude, plus samples of available crudes that he may run in the future. For the changing chemistry and economics of crude supply must be considered. In our unique pilot plant refinery, every foreseeable variable of feed, continuous operation, and end products will be explored.

2 TOPPING STARTS the duplication of actual refinery practice, by fractionating the sample crudes into gases, distillates, and reduced crudes. With this operation, the highly accurate recording of quantitative and qualitative analyses of the fractions begins ... the first of the voluminous data needed for final calculations is obtained.

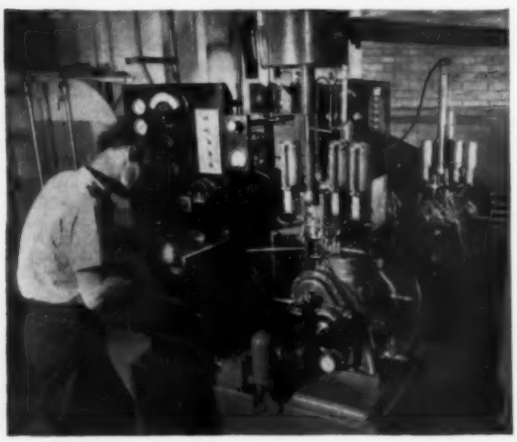
(CONTINUED ON FOLLOWING PAGES)

3 REDUCED CRUDE TREATMENT comes next. The effect of this propane decarbonizing operation upon the economics of cat-cracking is the subject of the investigation. Into the pilot go reduced crudes from the topping unit. Operations are varied to produce bottoms as low as 3½% on the crudes. Propane ratios, temperatures, throughputs, are also varied, and are tabulated to provide a graph of all runs.

4 TRUE YIELD DATA come from this cat-cracker of most advanced "Fluid" design. It is fed a mixture of decarbonized oils and gas oils from the topping unit. Catalysts, velocities, bed depths, are all varied to yield the desired gasoline quality standards, determine the most economical conversion rates, etc. For comparison, *reduced crudes* are also run directly, to obtain a contrasting pattern of yields, quality, and operational costs.



5 QUALITATIVE ANALYSES of feeds and products from all pilot runs are continuously performed in the Analytical Laboratory. Here, physical and chemical properties and other pertinent factors are assessed and carefully charted. When combined with utility statistics, operating conditions, and volume of yields from the pilots themselves, these data form a thoroughly sound basis for the final analysis by process engineers.



6 MOTOR FUEL COMPONENTS are engine tested. Operating as an adjunct to the Analytical Laboratory, test engines measure octane rating and lead susceptibility of gasolines. Gaseous components are analyzed in the Mass Spectrometer. Catalyst structure is continuously studied in X-Ray diffraction equipment. The comprehensive findings obtained from such modern analytical instruments form an important part of the complete report of the Analytical Laboratory.

7 HERE THE FACTS ARE TABULATED. And then, in the Process Design and Economics group, the complete data of the refiner's proposed and present refinery operations are weighed, with reference to specialized local costs – labor, utilities, transportation – and the specialized price structure for products in the proposed areas, both as of today and the foreseeable future. From this weighing of data comes a dependable, documented recommendation on which action can be safely taken.

The technique outlined on these pages is regularly applied by Kellogg to answering the questions of its customers seeking to determine whether earning power of a proposed operation is favorable. Once this all-important factor is established, the data are at hand for designing the customer's individual plant . . . and for constructing it with every assurance that it will operate as predicted, from initial run throughout its planned future.

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for the

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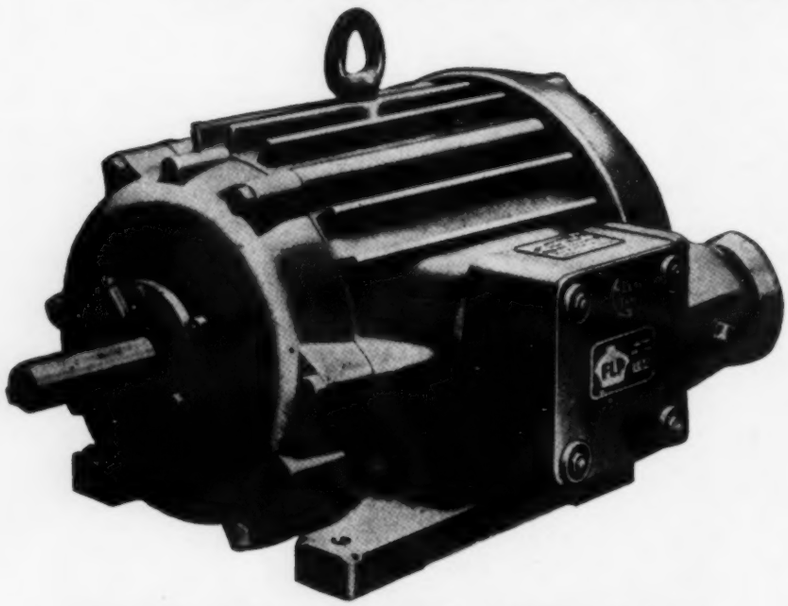

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Other mines and mills are located at Hector and Los Angeles, California; Fountain Farm, Missouri; Magnet Cove, Arkansas; Texarkana, Texas and Osage, Wyo.

Third of a series of advertisements featuring our mine and mill facilities.

The EL PORTAL, California, mine and processing plant of Baroid Sales Division have been the principal source of weighting material for drilling mud used by the Pacific Coast Oil Industry for many years.

The illustration above shows part of the 3400-foot overhead tram which conveys crude barytes from the mine to the mill. Lower illustration shows the mill and some of the mine entrances.

BAROID, the pioneer weighting material, helps prevent blowouts by confining gas, water and oil to their respective formations, and prevents stuck tools and loss of hole by checking caving.

BAROID PRODUCTS: ANHYDROX • AQUAGEL • AQUAGEL CEMENT • BAROCO • BAROID • FIBERTEX • IMPERMEX MICATEX • SMENTOX • STABILITE • ZEOGEL • TESTING EQUIPMENT • BAROID WELL LOGGING SERVICE

PATENT LICENSES unrestricted as to sources of supply of materials, but on royalty bases, will be granted to responsible oil companies and others desiring to practice the subject matter of any and/or all of United States Patents Numbers 1,807,082; 1,991,637; 2,041,086; 2,044,758; 2,064,936; 2,094,316; 2,119,829; 2,214,366; 2,294,877; 2,304,256 and further improvements thereof. Applications for Licenses should be made to the Los Angeles office.

Baroid

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NATIONAL LEAD COMPANY

BAROID SALES OFFICES: LOS ANGELES 12, TULSA 3, HOUSTON 2

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GULF OIL CORPORATION

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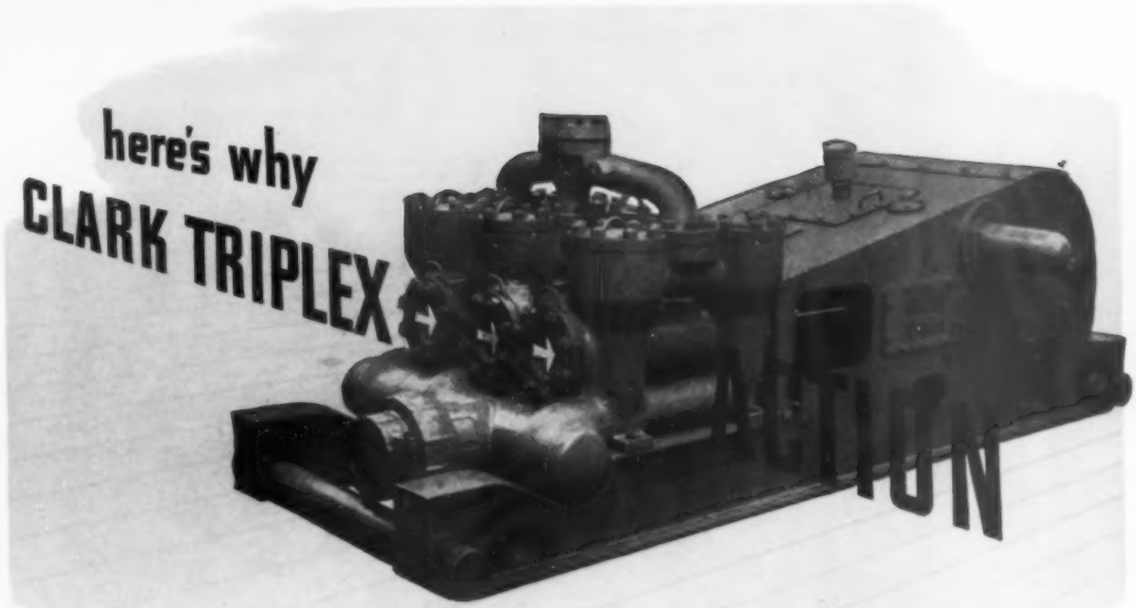
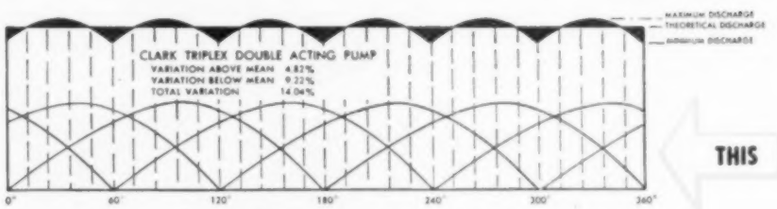
here's why CLARK TRIPLEX



means LESS vibration . . . LONGER life

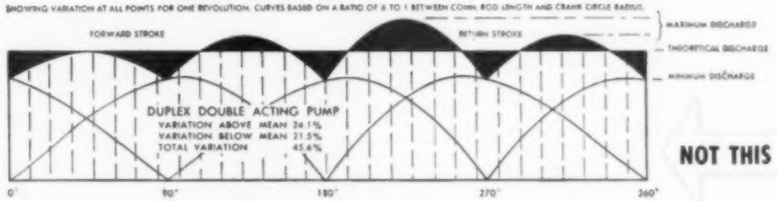


THIS

THREE double-acting pistons instead of two, smooths out pumping impulses . . . produces ⅔ less variation in discharge pressures . . . reduces shock and wear on the entire mechanical and hydraulic system.

DIAGRAMS OF DISCHARGE FLOW FROM PUMPS

SHOWING VARIATION AT ALL POINTS FOR ONE REVOLUTION. CURVES BASED ON A RATIO OF 6 TO 1 BETWEEN CONN. ROD LENGTH AND CRANK CIRCLE RADIUS.



NOT THIS

Conventional duplex pump produces more than three times as wide variations in discharge pressure . . . creates irregular pulsations affecting smoothness of engine operation as well as pump output.

Smoother output and longer life are just two important advantages of Clark Triplex Slush Pumps. All steel construction makes them tougher . . . cuts weight by one-third . . . reduces size and bulk for easier portability Get the full story—today!

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Regional Sales Offices: Columbus 8, Ohio; Dallas 1, Texas; Los Angeles 13, Calif. Export: 122 East 42nd Street, New York 17, New York . . . Sales Offices, Stores and Distributors in all active oil fields.

CLARK STEEL *Triplex*

Sold by American Pipe and Supply Co.; Bovaird Supply Company; H. & B. Sales Company; Howard Supply Company; Ideco Stores & Sales Offices; J. & L. Supply Company; Lucey Products Corporation; Mid-Continent Supply Co.; Republic Supply Company. EXPORT: International Derrick & Equipment Co.; Clark Brothers Company, Inc.

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Standard-Vacuum pioneered the distribution of petroleum products in the Far East. For over fifty years we have been the leading manufacturer and distributor of high grade petroleum products in that area.

STANDARD-VACUUM OIL COMPANY

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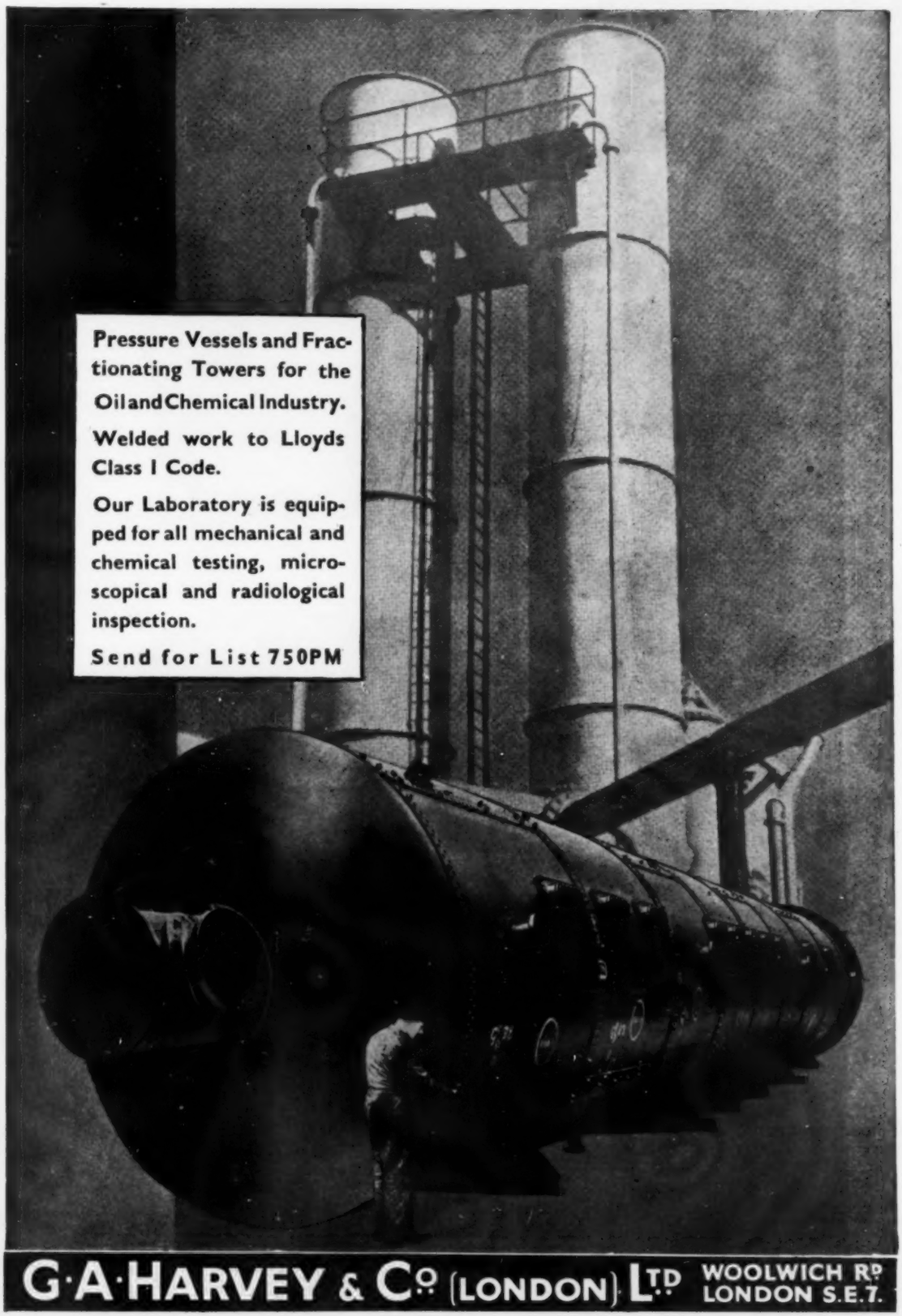
CONSISTENCY OF PRODUCTION

Each drum in the unending stream that leaves the production line of METAL CONTAINERS is tested for quality and exactness, each one must be a twin to its neighbour. We manufacture to your specifications or deliver from stock sizes—we shall be pleased to help you in your transport difficulties.

Metal Containers

Metal Containers Ltd., Seymour House, Pall Mall, London. Works—North of England & Scotland. Associated Companies Overseas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Chemical Plants,
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...fully equipped laboratories and pilot plants are available for determining sound design basis and for the development of new processes and processing equipment.

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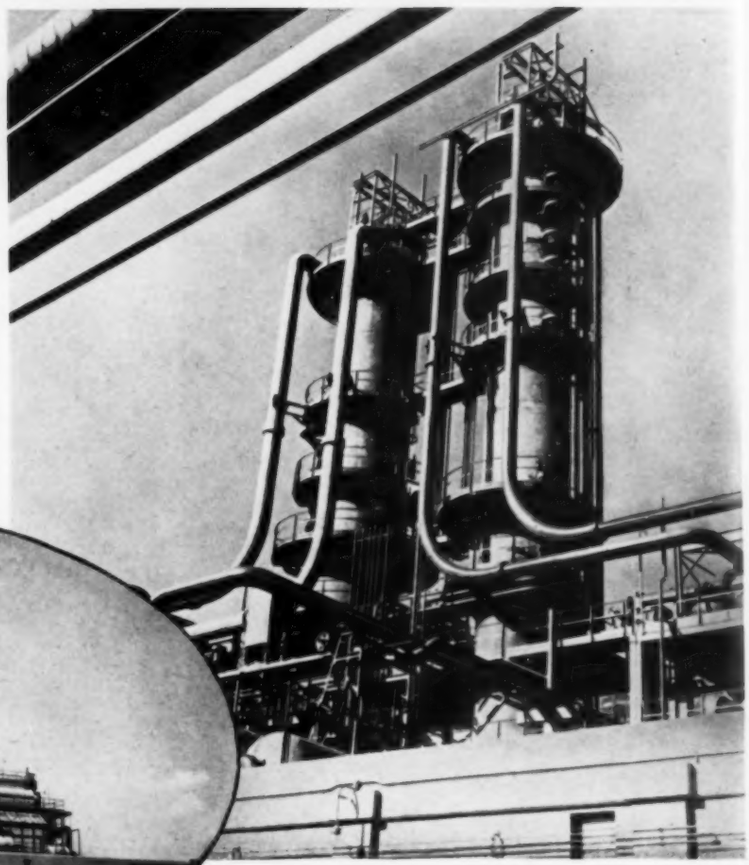

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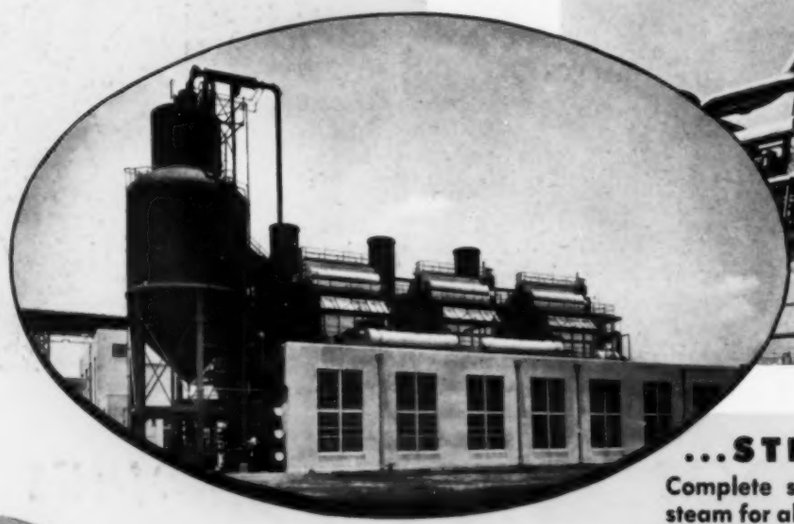
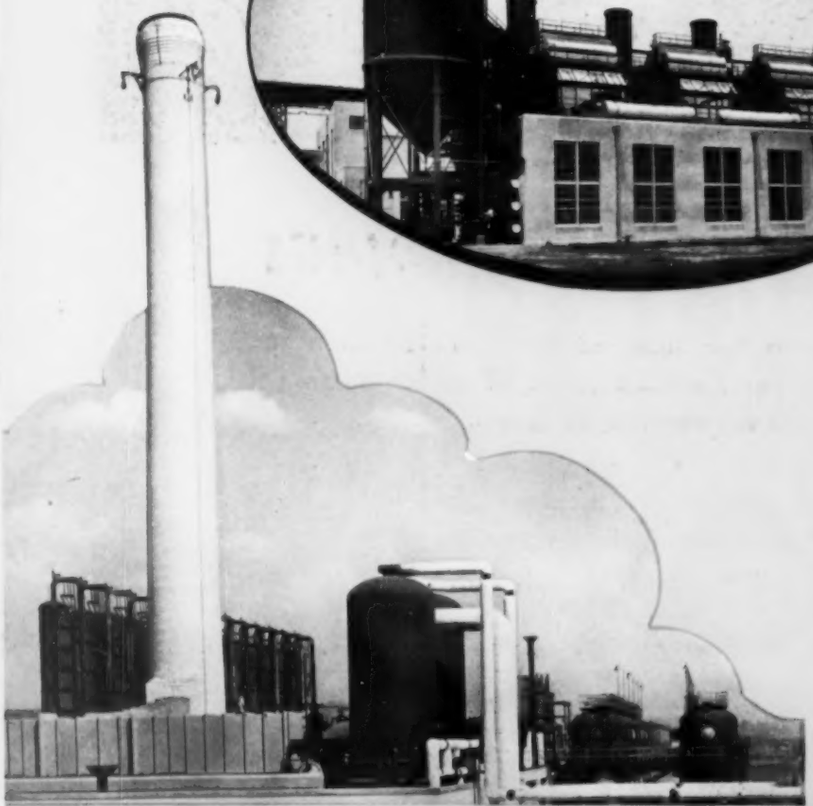
Hypersorption, Fluid Catalytic Cracking, Precise Fractionation, Solutizing, Furfural Refining, MEK Solvent Dewaxing, Ethylene Manufacture, Polymerization, Isomerization, Thermal Cracking and Reforming, etc. For complete list and technical description write for Bulletin O-46-1.





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Complete steam generating plants to supply steam for all requirements. Units constructed for any specified temperature and pressure, and for all types of firing. Design and construction of power plant component equipment — pulverized fuel systems, superheaters, economizers, waterwalls, condensers, evaporators, steam jet ejectors and cooling towers. Complete information in Bulletin B-46-6.

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Recent advances in applied chemistry include processes for hydrogenation and deodorization of glyceride oils, fatty acid fractional distillation, oil body and synthetic resin manufacture. Service to other process industries covers systems for recovery of useful by-products in paper pulp manufacture and waste heat boilers for use in sulphuric acid manufacture. Complete information in Bulletin 1D-46-3.

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SHORT TAKE-OFFS . . . SMOOTH LANDINGS

Executives and sportsmen who fly will welcome the noteworthy engineering advancements now incorporated in the famous *Grumman Widgeon Amphibian.*

The new *Widgeon,* for example, possesses a deeper Bow Section providing for better water handling and increased stability. Its newly-designed hull bottom, too, is equipped with Step Vents, latest U. S. Navy innovation for flying boats, that aerate the afterbody and buoy the ship on an air cushion for short take-offs, smooth landings. The net result is materially to extend the *Widgeon's* water performance and range of service. Its enhanced ability to alight upon and depart from even the smaller lakes and more limited water areas is truly outstanding.

Available for immediate delivery.
For complete information write Sales Department.

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AIRCRAFT ENGINEERING CORPORATION

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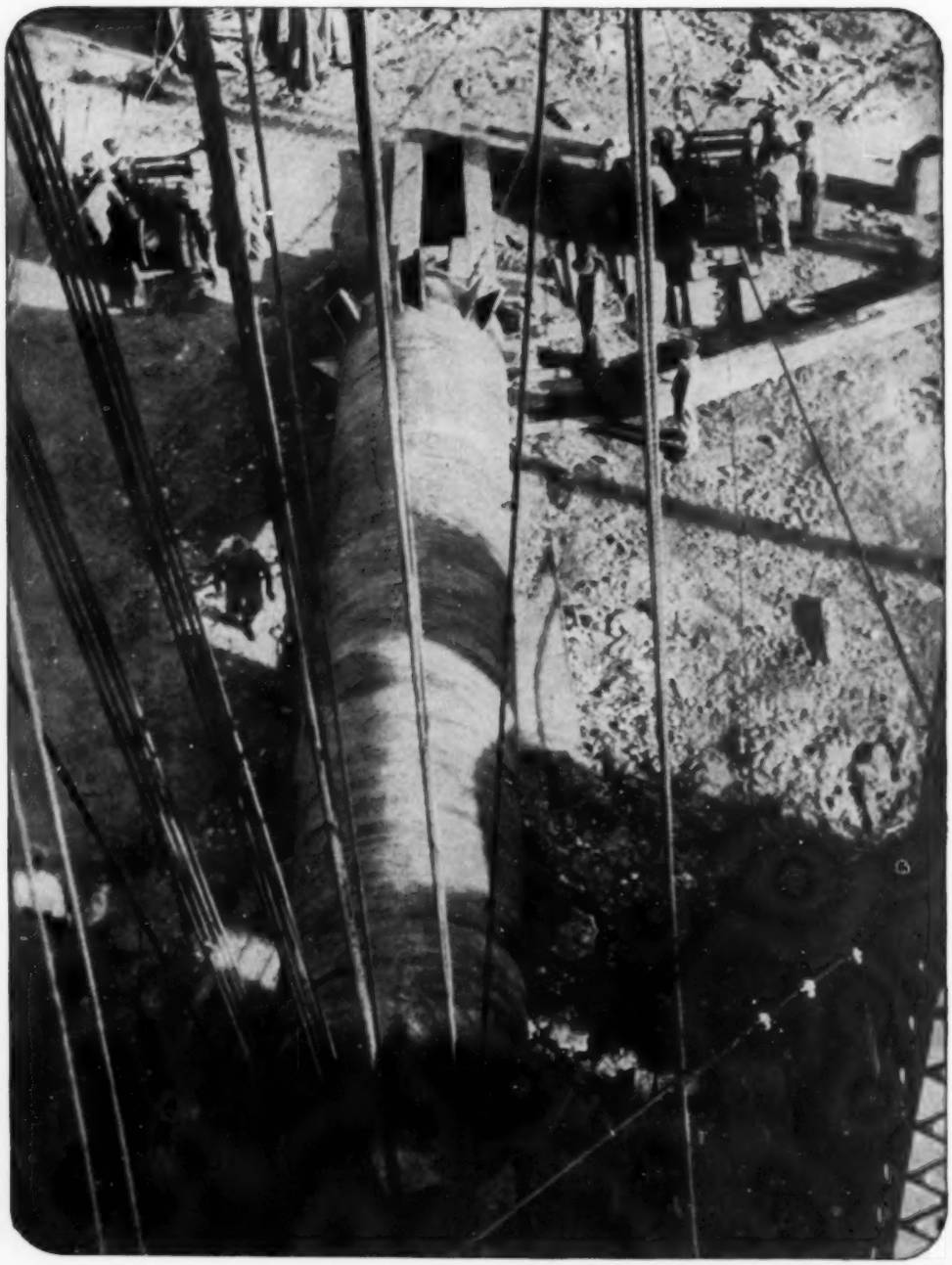

HOLLOW FORGINGS *for* OIL CRACKING PLANT

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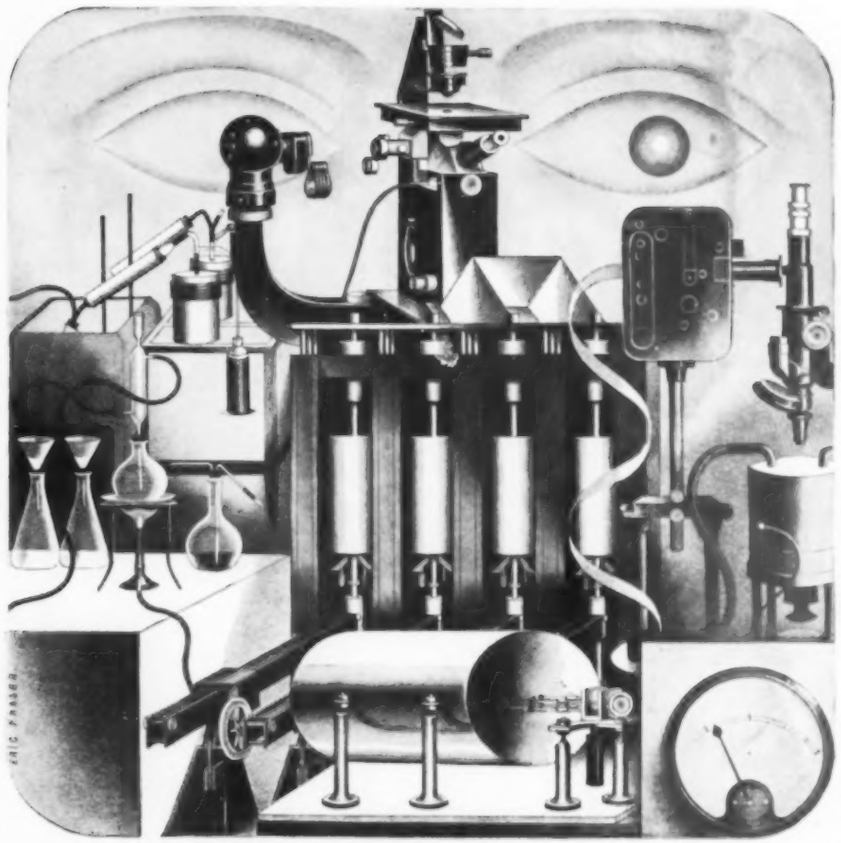

Design by Eric Fraser

MOSAICS OF STEEL

NUMBER TWELVE

A large proportion of the inventions, discoveries and improvements takes place in Works Laboratories, by force of circumstances arising out of day-to-day production. Yet, although this organisation has many Works Research Laboratories attached to its large producing units, this is not considered enough. So there has been equipped and organised a central Research and Development Department whose functions are wider, which undertakes investigations of a character beyond those appropriate to a works laboratory, of common interest to all the works, and to the industry generally, and bordering upon pure research. Such an organisation is of necessity closely in touch with Research Associations in the industry and with academic and state Research organisations, so that it contributes, both in material and service, to the general pool of knowledge of the scientific world.

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SAFETY
STABILITY
MOBILITY

Patented bulge feature allows racking of the drill pipe inside the mast.

DRILLING AND EXPLORATION COMPANY, INC.
Purchased this Complete Unit for Operation in Venezuela

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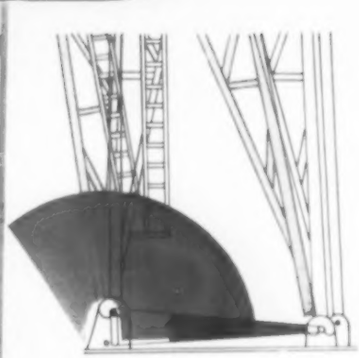
G-500 DRILLING RIG *with* PORTABLE MAST

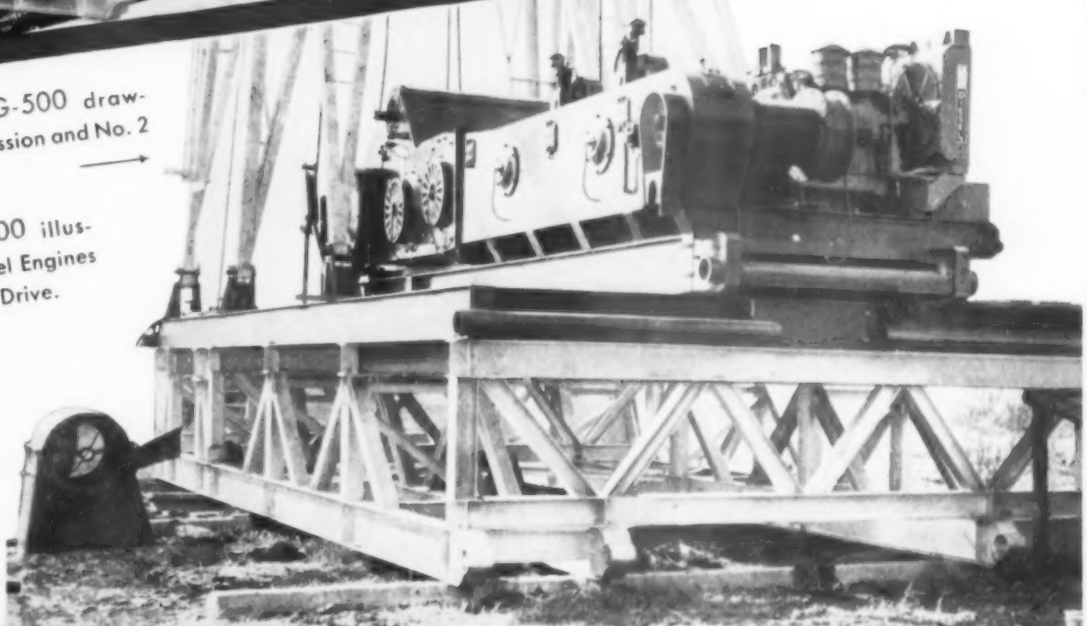


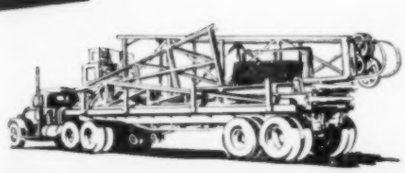
NO SNUB LINE NECESSARY

Dual Pivot feature permits entire operation of raising mast to be accomplished with line in tension. Unique design eliminates mast falling over center as it approaches its working position. *A Snubbing Line is not needed.*

Right: Side view showing G-500 drawworks, Compounding Transmission and No. 2 Engine. →

Left: Side and rear view of G-500 illustrating G-M Series 71 Twin 6 Diesel Engines and Fawick Air-Flex Clutch Pump Drive. ←





CONTINENTAL

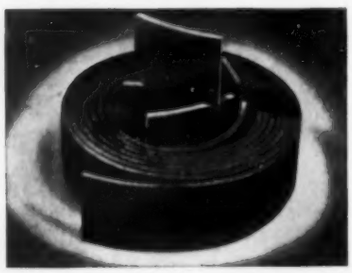
SERVING THE OIL AND GAS INDUSTRIES

T IN BINDING

What did you do in the world-war, Ferodo?

ANOTHER VITAL JOB . . . WE DEVELOPED THE FEROBESTOS AIRSCREW SECURING CONES FOR ROLLS-ROYCE ENGINES

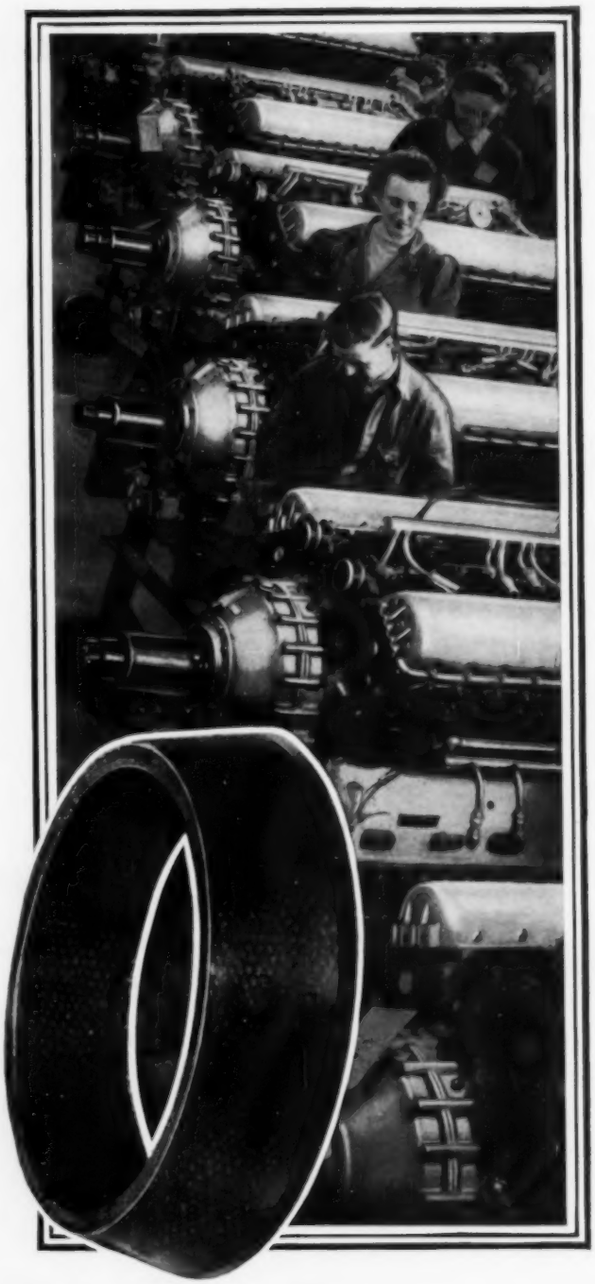
WE SERVE THE PETROLEUM INDUSTRY EQUALLY EFFICIENTLY



Before the Ferobestos collet was developed, airscrew securing cones were manufactured in various metals. In actual service, however, the vibration caused by the mechanism running at high speed resulted in fretting between the airscrew shaft and the metal securing cone and between the cone and the metal airscrew hub.

In their Research Laboratory Ferodo Limited, in close co-operation with Rolls-Royce Limited, evolved a moulded non-metallic cone, machined to extremely fine tolerances which resulted in the fretting problem being solved. A further advantage—it acted as a perfect oil-seal between the airscrew hub and the shaft.

What does this mean to you? Simply this. The research which was directed to war-time needs has at all times been devoted to the particular problems of the petroleum industry. The result is that no matter how strenuous the conditions under which drawworks brakes operate in drilling there is a Ferodo friction material designed specifically for that job. That's why, where long wear and low running costs are the primary considerations, it pays to specify Ferodo Friction Materials.



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LARGEST SUPPLIERS OF FRICTION MATERIALS IN THE BRITISH WAR EFFORT REG. TRADE MARK FERODO

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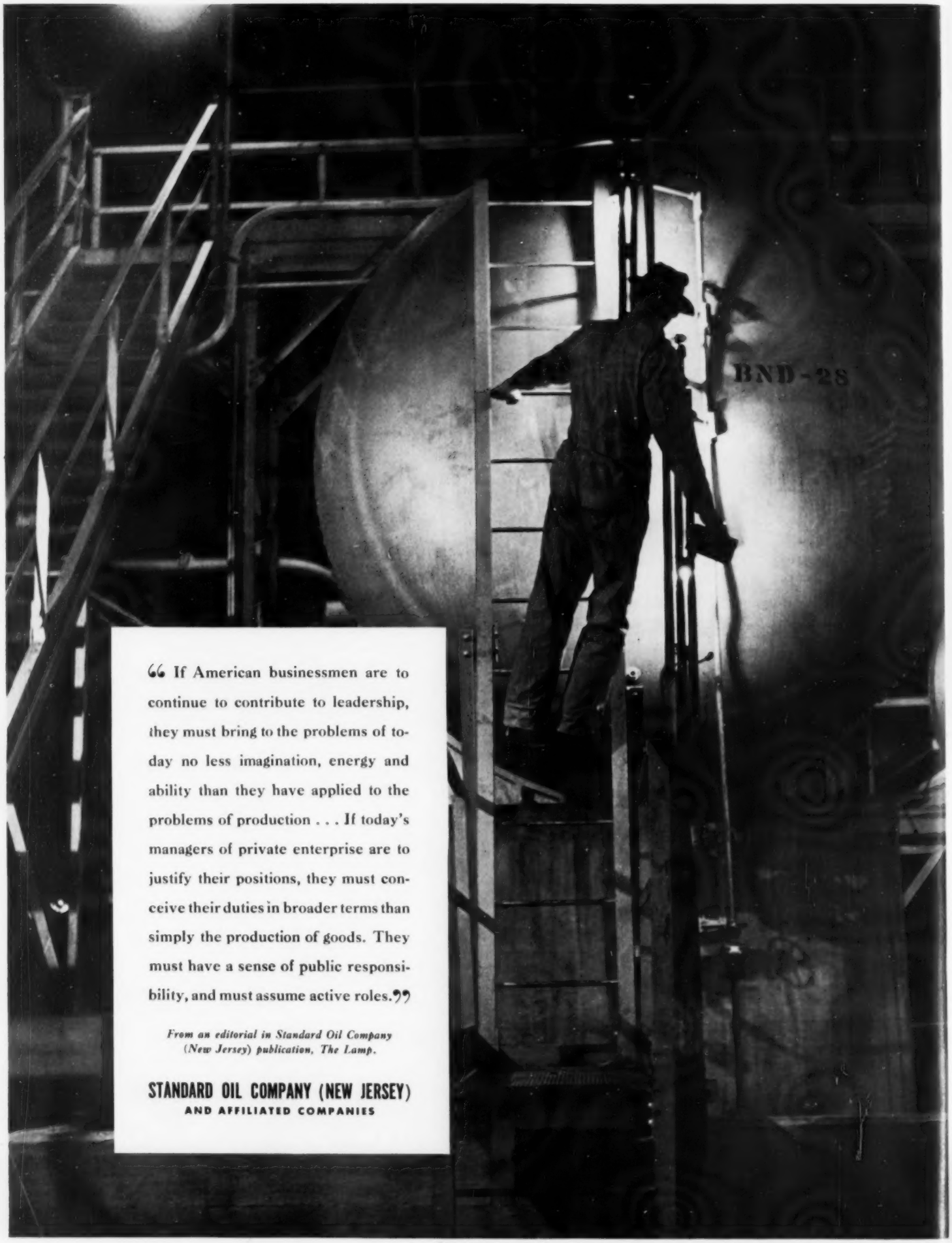
THERE IS MORE IN IT THAN THE NAME DENOTES

"WAR OF NERVES"... "BLITZ"... OR "TOTAL WAR"
IT WAS WAR FOR OIL AND OIL FOR WAR

Rumania, Poland, Russia, Burma, Borneo are the principal sources of oil supply that were occupied by the enemy.

Reconstruction demands reliable and economical equipment. Therefore specify Blackstone totally enclosed oil engines.

BLACKSTONE AND CO. LTD. · STAMFORD · ENGLAND

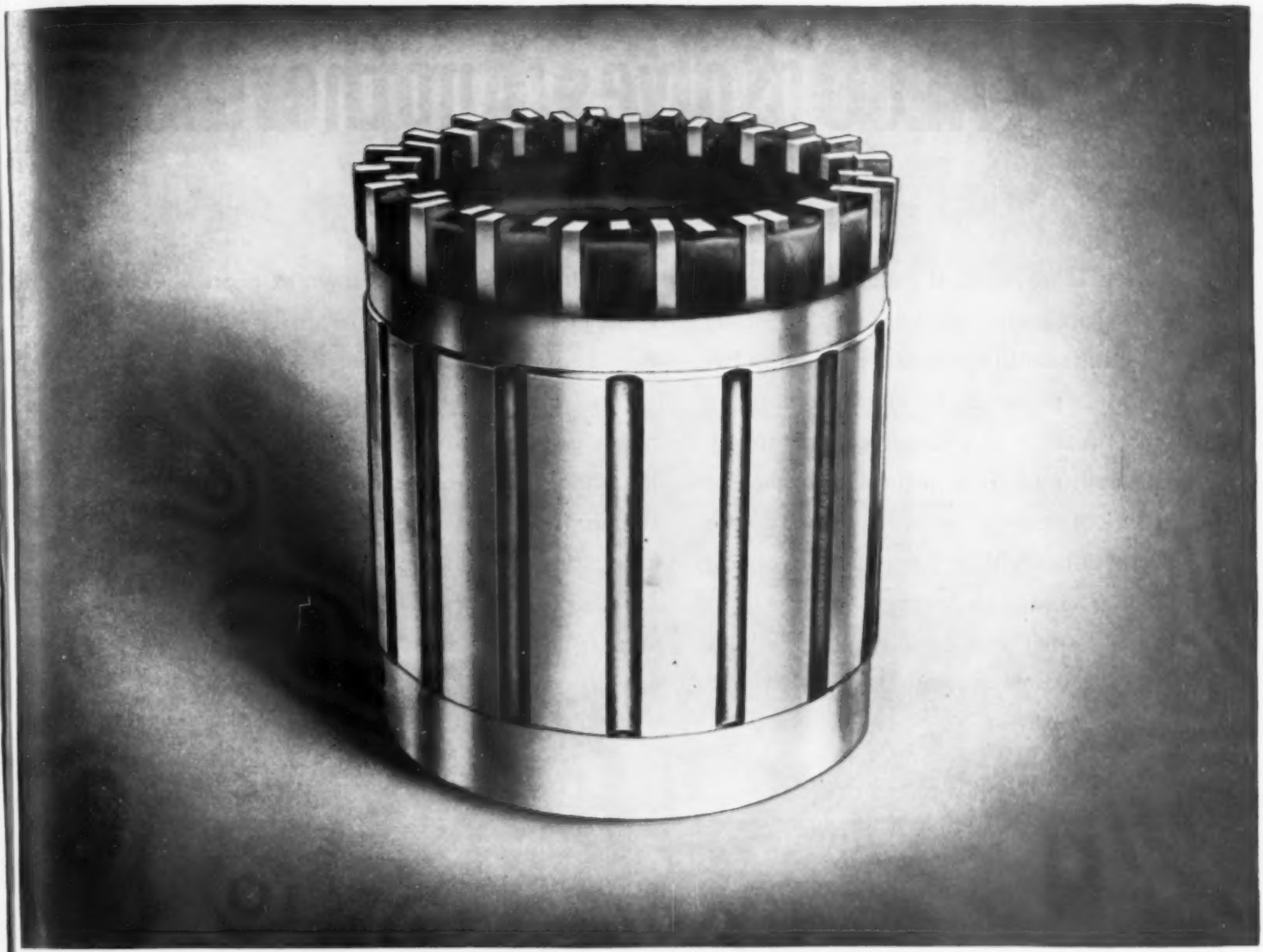


“If American businessmen are to continue to contribute to leadership, they must bring to the problems of today no less imagination, energy and ability than they have applied to the problems of production . . . If today's managers of private enterprise are to justify their positions, they must conceive their duties in broader terms than simply the production of goods. They must have a sense of public responsibility, and must assume active roles.”

From an editorial in Standard Oil Company (New Jersey) publication, The Lamp.

STANDARD OIL COMPANY (NEW JERSEY)
AND AFFILIATED COMPANIES

Checking the level on a storage drum. Chemical Products Division, Baton Rouge, La.



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Carbometal *a new hard facing material*

Working on a new principle, it combines near-diamond hardness with the toughness of a high grade steel; this eliminates all risks of chipping or breakage and results in a material of great cutting and wear-resisting qualities. "Carbometal" is designed to stand up to the toughest job and actual experience has shown it to be able to take an unbelievable amount of misuse. The illustration shows a drill bit with "Carbometal" inserts, as supplied to one of the largest oil firms in the world.

Write to us for further particulars.

CARBOMETALS LIMITED

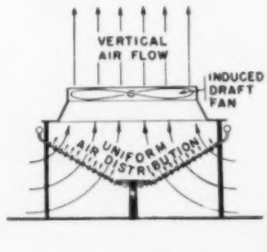
Aquila St., St. John's Wood, London, N.W.8, England. Cables: Carbometal, London

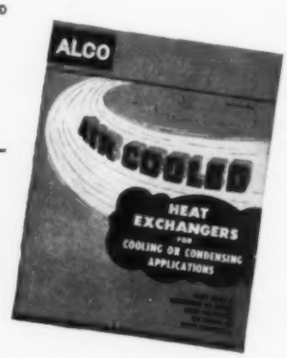
ALCO Solves Another Major

ALCO service to the oil industry comprises numerous items. In many leading oil refineries and petroleum by-product plants, ALCO Heat Exchangers in one form or another conspicuously predominate. It is natural, therefore, to think of ALCO particularly when you are confronted with any problem involving heat exchangers. Among the most difficult of such problems are those where cooling water is limited, expensive, or scale-forming.

In such circumstances ALCO Air-Cooled Heat Exchangers do an efficient job of cooling jacket water, oil, oil products, vapors and gases, steam condensing, etc. Moreover, a single ALCO Air-Cooled Heat Exchanger can be used to do several jobs simultaneously, and can be operated with practically any drive—electric motor, diesel or gasoline engine, steam turbine.

Each of the battery, shown at right, cools jacket water and lubricating for a diesel engine pipe line compressor and is designed to operate at 100° F. maximum air temperature. The diagram below shows how the uniform air distribution, induced draft operation, and vertical air-flow principle in ALCO Air-Cooled Heat Exchangers permit high efficiency at all times, regardless of wind direction or velocity.





WRITE FOR ALCO BULLETIN CONTAINING FULL DESCRIPTION, ILLUSTRATIONS, AND ENGINEERING DATA.

American Locomotive Company, 30 Church Street, New York 8, N. Y.
Beaumont Iron Works, Beaumont, Texas

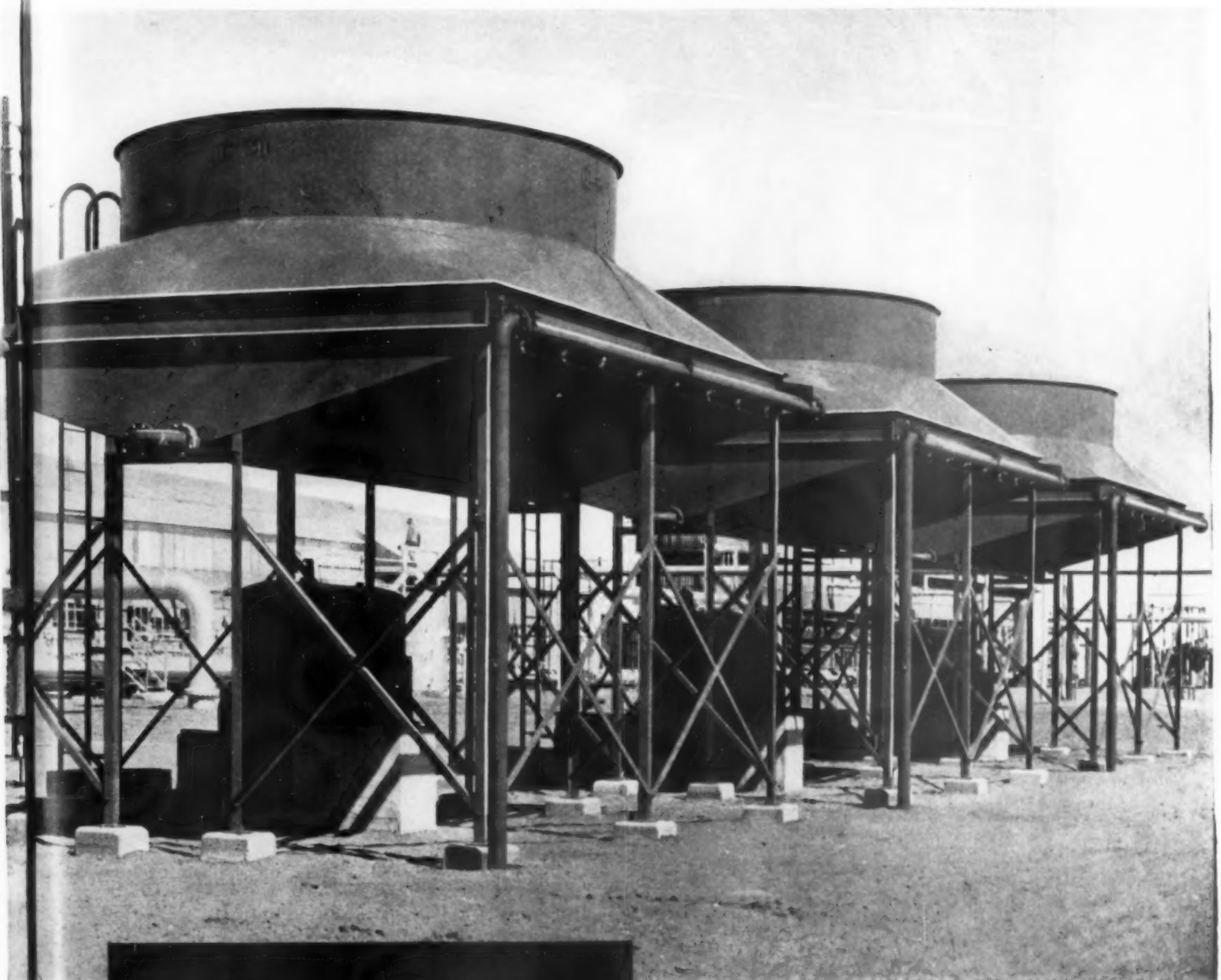
ALCO PRODUCTS FOR THE OIL INDUSTRY

Heat Exchangers • Air-Cooled Heat Exchangers Coolers • Columns • Fuel Oil Heaters • Lube Oil Coolers • Pressure Vessels • Reboilers • Pipe Line Filters • Waste Heat Boilers • Feedwater Heaters • Evaporators • Converters • Prefabricated Piping • Diesel Engines.

BEAUMONT IRON WORKS COMPANY

Manufacturers of Electric Steel and Alloy Castings, Dreadnaught Rotary Drilling and Production Equipment, including: Draw Works, Crown Blocks, Traveling Blocks, Coring Reels, Tubing Heads and Well Heads.

Problem for the Oil Industry



American Locomotive

Alco

THE MARK OF MODERN ENGINEERING

Now!

G·MV

COMPACTNESS
RELIABILITY
VERSATILITY
ECONOMY

in the smaller

G·MX

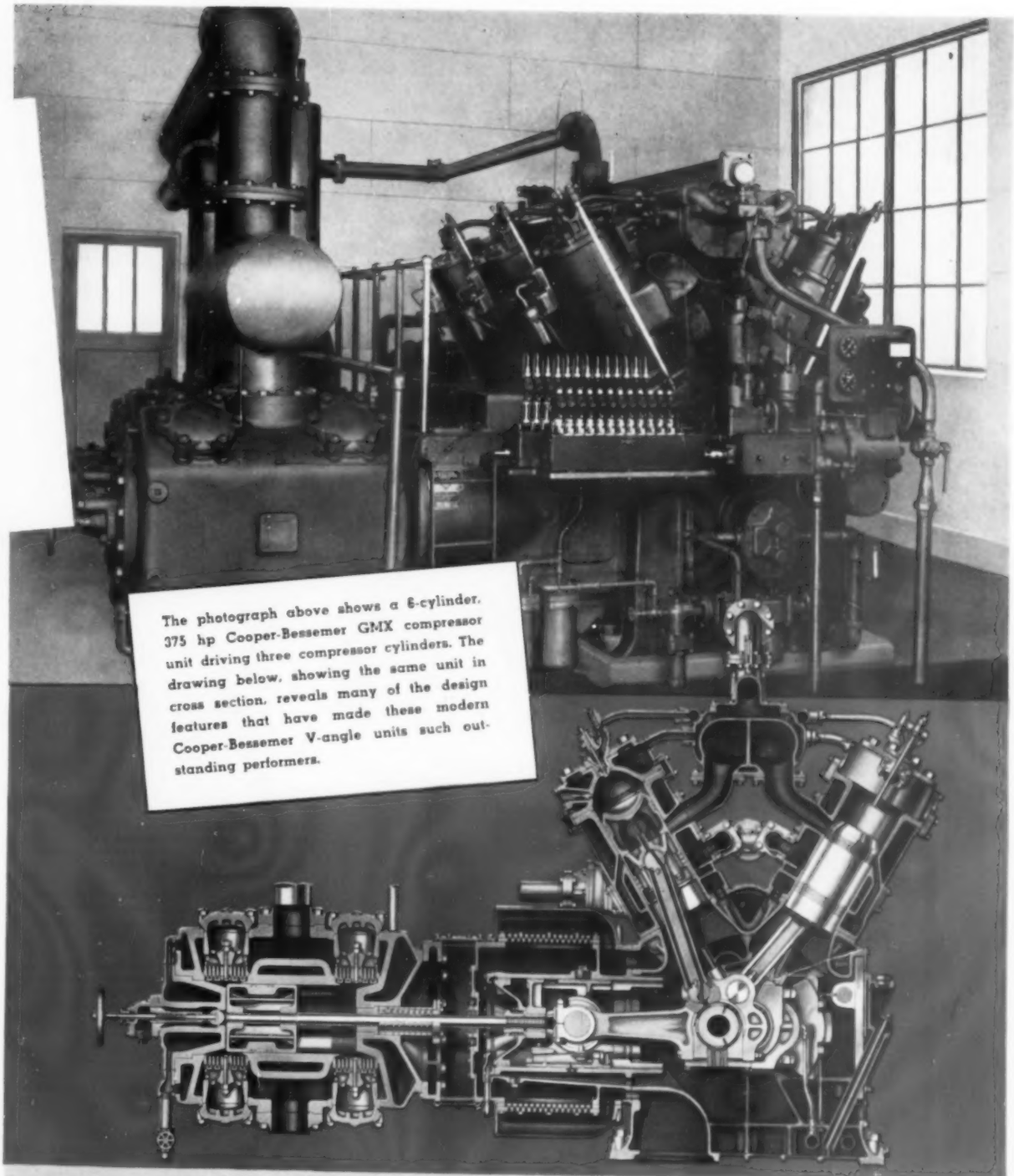
Cooper-Bessemer's highly successful V-angle, 2-cycle compressor units are now built in two power cylinder sizes: Type GMX from 250 to 625 hp; Type GMV from 400 to 1000 hp. Both are built in 4, 6, 8, and 10 cylinder sizes rated 62½ and 100 hp per cylinder respectively.

Repeatedly, in hundreds of outstanding installations, the GMV has demonstrated the value of its modern design and its many advanced features. Now, without exception, all these advantages are available in the smaller GMX for those compressor jobs requiring less power but all the stamina, on-stream reliability, and operating economy for which the GMV is noted.

The nearest Cooper-Bessemer office is always ready to cooperate with you or your engineers in investigating and planning the ideal compressor set-up for your present or future needs.

TYPE G·MV & G·MX **Compressors**

New York Washington Bradford, Pa. Parkersburg, W. Va. San Francisco, Cal. Seattle, Wash.



The photograph above shows a 6-cylinder, 375 hp Cooper-Bessemer GMX compressor unit driving three compressor cylinders. The drawing below, showing the same unit in cross section, reveals many of the design features that have made these modern Cooper-Bessemer V-angle units such outstanding performers.

by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

Houston, Dallas, Greggton, Pampa and Odessa, Texas Tulsa Shreveport St. Louis Los Angeles

The material in a valve must suit the service, POWELL *has all kinds!*

100 YEARS in the School of Experience has taught us many valuable lessons. Not the least of these is the importance of using the *right* valve in the *right* place. Not only type and design but *material* as well must be "just what the doctor ordered."

It is poor economy to use iron when steel is definitely indicated. On the other hand, if iron is thoroughly adequate for the job, there's no sense in using a more expensive material.

The POWELL lines of Iron and Steel Valves are so complete that there's a valve of correct type, size, and design for every service in which these valves are applicable. Equally complete lines of Bronze Valves and Valves to resist all known corrosive media are included in the Complete POWELL Line. The latter are made in the widest range of pure metals and special alloys ever used in making valves. POWELL Engineers are always ready to help you select the right valves.

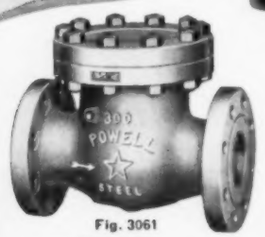


Fig. 3061

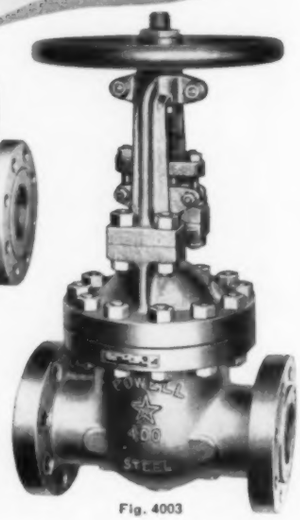


Fig. 4003

Fig. 1460

Fig. 1793

Fig. 241

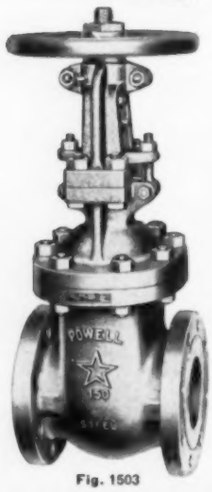


Fig. 1503

Fig. 4003—Class 400-pound Cast Steel Gate Valve. Has flanged ends, outside screw rising stem, bolted flanged yoke and taper wedge solid disc. Powell Cast Steel Valves are available in pressure classes from 150 to 2500 pounds, inclusive.

Fig. 3061—Class 300-pound Cast Steel Swing Check Valve with flanged ends and bolted cap.

Fig. 1460—Iron Body Bronze Mounted "Master Pilot" Gate Valve. Screwed ends, rising stem, bolted flanged bonnet and taper wedge solid disc. Also available in all iron.

Fig. 1503—Class 150-pound Cast Steel Gate Valve. Has flanged ends, outside screw rising stem, bolted flanged yoke and taper wedge solid disc.

Fig. 241—125-pound Iron Body Bronze Mounted Globe Valve. Has flanged ends, outside screw rising stem, bolted flanged yoke, and regrindable, renewable bronze seat and disc. Also available in All Iron.

Fig. 1793—125-pound Iron Body Bronze Mounted Gate Valve. Has flanged ends, outside screw rising stem, bolted flanged yoke, bronze seat rings and taper wedge solid disc. Also available in All Iron.

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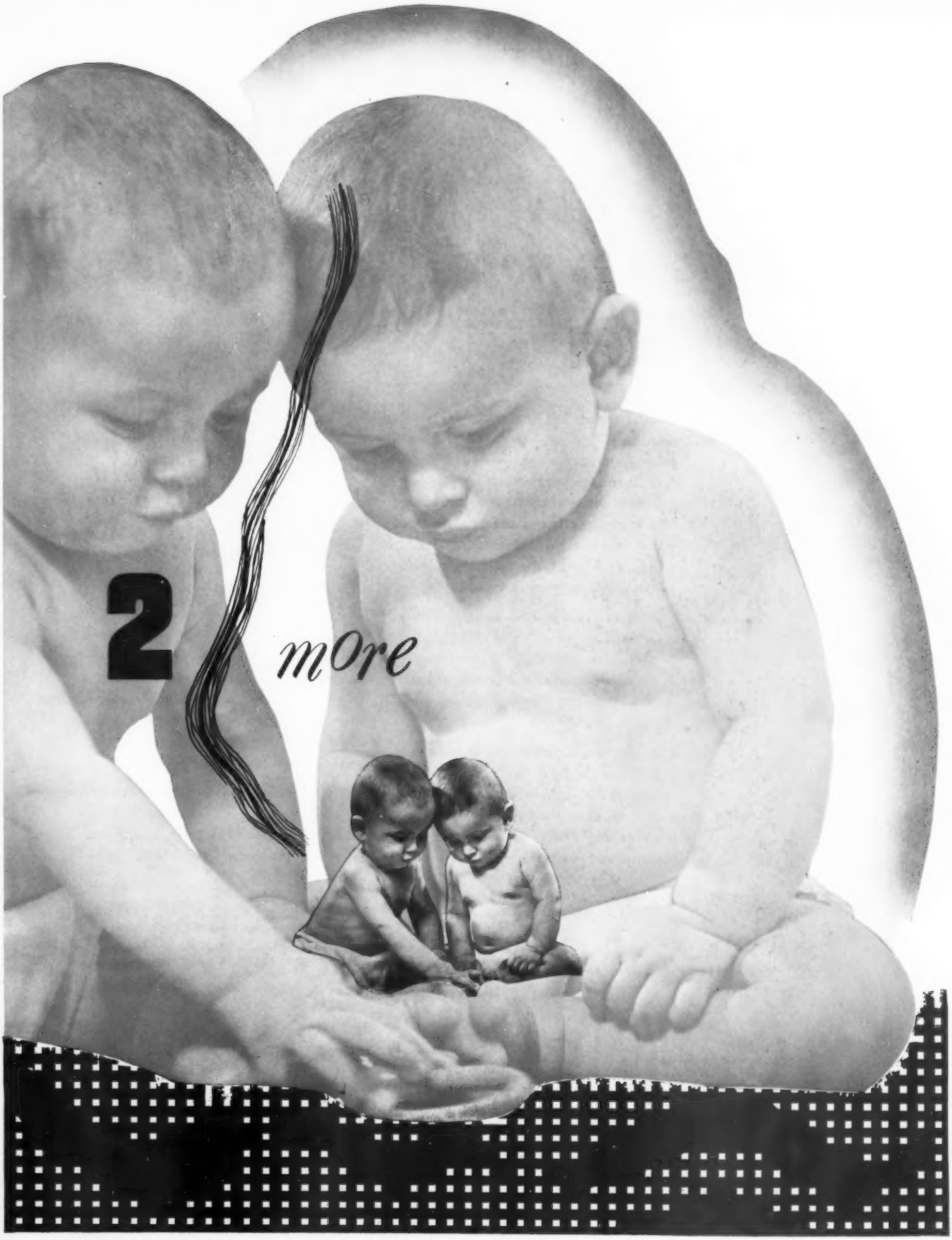
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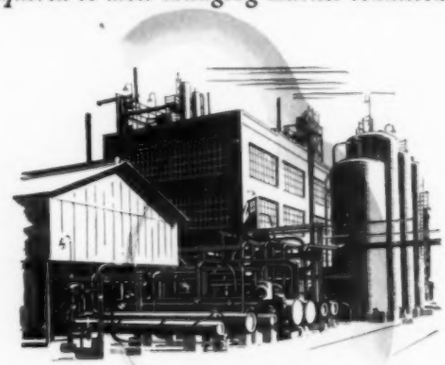

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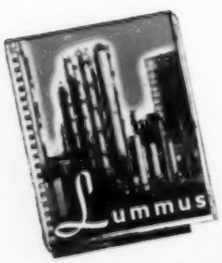

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New Lion unit will process wide-cut sour stocks over synthetic catalyst

Lion Oil Company, of El Dorado, Arkansas, has contracted to construct the 70th Houdry-licensed cat-cracker, a TCC unit of 4500 bbl. fresh-feed capacity, with additional capacity for recycling. It will process sour stocks of wide boiling range, over synthetic catalyst.

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- **built-in recycling, permitting variation at will of product distribution according to seasonal demands—optimum yields of motor gasoline for the warmer months, proportioned production of distillate heating oil for winter.**

The small TCC unit is not an engineering "guinea pig," but a well-proved design which has been engineered from the ground up, with the same basic design features of the larger commercial TCC plants. Economics, not expediency, have guided its basic planning—have made TCC the catalytic cracking process most favored by operators of small refineries. In cost per ton of steel used in construction, in cost per barrel of high-octane gasoline produced and by other equally decisive standards, the small TCC unit will compare favorably with the catalytic cracking operations of major companies. Details will be furnished gladly to interested refiners.

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EDITORIAL

FOR A SOUND NATIONAL RUBBER POLICY

World capacity for the production of synthetic rubber now exceeds 1,400,000 long tons yearly according to a report by the Inter Agency Policy Committee on Rubber of which William L. Batt is chairman. Once the plantations of the Far East are restored to normal productivity they will be able to supply 1,600,000 to 1,800,000 tons of natural rubber annually while lesser amounts will be obtainable from other parts of the world. As top peacetime consumption by the United States was 781,000 tons in 1941 while the rest of the world used perhaps 650,000 tons, it is obvious that there is no reason for anticipating a shortage of rubber even though consumption should rise substantially. As is well known the bulk of the facilities for synthetic production are located within the United States while the natural rubber industry is concentrated principally in Malaya and the East Indies with relatively small quantities derivable from Africa and South America.

Against this background it is the task of the Inter-Agency Committee to draft plans for a national rubber policy. The problem is one primarily of selection. Only a preliminary report has been issued thus far by the Inter-Agency Policy Committee. This is to be followed by a more detailed supplemental statement suggesting possible legislation by Congress to implement a definite national policy. Perusal of the preliminary report, however, indicates that the probable recommendation will be in favor of maintaining a part, naturally, the most economically efficient part, of the present facilities for synthetic production, while continuing to draw upon natural supplies for a portion of the country's requirements.

Numerous arguments can be adduced in support of such a course. In the opinion of the committee synthetic rubber, although great improvement has been made in its fabrication during the few years since the industry was established, is not yet satisfactory for exclusive use in the manufacture of heavy truck tires, airplane tires and certain medical products. Natural rubber is still needed for such uses. It is admitted that these disadvantages of the synthetic product may and very likely will be overcome by further research and experimentation. Butyl, neoprene and butadiene-acrylonitrile types of synthetic are definitely superior to natural for certain special uses and production of these specialty types should be continued.

In the matter of cost exact comparison is difficult. In the pre-war period practically all of the plantation rubber output was under the control of an international cartel for a great part of the time. Prices ranged from above a dollar a pound to as little as four cents a pound at different periods. It has been estimated by competent authorities that under normal conditions natural rubber can be profitably produced to sell at eight to ten cents a pound.

In the case of the synthetic product the primary objective during the war was to obtain a large output in the shortest possible time. Cost was a relatively negligible consideration. Many of the plants constructed used alcohol as a base material which admittedly is more expensive than petroleum gases. In some of the lowest-cost plants GR-S, the general purpose synthetic, has been produced for eleven cents a pound without allowance for depreciation, profit or administrative expenses. The committee suggest that with reasonable provision for these factors this grade of synthetic can be sold at 15 to 16 cents a pound. During the war period, with purchases and sales in the hands of government agencies, natural rubber has been sold to manufacturers at 22½ cents while the official price for GR-S has been 18½ cents. In the view of the committee synthetic rubber may very well reach a position in the future where it can maintain itself competitively but for the present it probably will be at a disadvantage in this respect.

In the light of experience the maintenance of a virile synthetic industry is highly desirable both as a protection against the exaction of exorbitant prices for imports of natural and as a safeguard against a repetition of the shutting off of imports. The committee recommends that at least one-third of the country's annual needs, aside from specialty types, be derived from synthetic production. Total requirements it estimates at 750,000 long tons which would result, if the suggestion were adopted, in the manufacture of 250,000 tons of GR-S and the importation of 500,000 tons of natural. These proportions are stated only tentatively, however, and the committee points out that it may become desirable to revise them.

While suggesting the limitation of synthetic production to less than a third of present capacity the committee proposes that efficient general purpose plants not required for operation, including at least one alcohol plant, be kept by the government as a stand-by reserve for use in case of emergency. The committee unequivocally favors the use of petroleum rather than alcohol plants as operating units, pointing out that the entire proposed production would require less than one-quarter of one percent of the nation's crude oil output. It also agrees that the synthetic rubber industry should be privately owned and operated though recognizing that this will not be possible until a settled governmental policy is arrived at.

SARATOV-MOSCOW GAS PIPELINE

Marks Important Step in Soviet Industrial Progress

530 Mile Line to Supply Moscow With 28 Million Cu. Ft. of Gas Daily from 2 Trillion Ft. Field

One of the Hundred River Crossings on the Saratov-Moscow Line.

WORK is nearing completion on the first long-distance natural gas pipeline to be built in the Soviet Union. It is 850 kilometers in length, passes through five districts and crosses about a hundred rivers. The Moscow City Soviet is directing its construction. The pipeline, of 10- to 12-inch diameter, will bring natural gas from the huge Saratov gas field to Moscow to provide fuel for industrial expansion and domestic use.

The decision to use the rich deposits of natural gas at Yelshanka, near Saratov on the Volga, to supply Moscow was approved in 1944 by the state planning commission upon the recommendation of the commissariats concerned wth the various economic administrations located in Moscow. It was presented to the 17th session of the Moscow City Soviet on December 7, 1944, by G. M. Popov, then deputy mayor of the Moscow Municipal Soviet but since elected mayor to fill a vacancy caused by the elevation of V. P. Pronin to the post of vice chairman of the Council of People's Commissars of the RSFSR.

The pipeline passes through five regions, Saratov, Penza, Tambov, Ryazan and Moscow, and crosses about a hundred rivers and streams. Divers working at the river crossings have dug trenches and laid pipes in the beds of such rivers as the Oka, the Moskva and the Tsna. It also crosses under 400 railway lines and metalled roads and traverses 115 kilometers of forests. Excavation for the line amounted to more than three million cubic meters. The total weight of the pipe is over 50,000 tons. Building materials of a total weight of about 700,000 tons have been brought up to build various installations on the line. Over 150,000 cubic meters of timber alone were required for the job.

At Yelshanka 44 wells have been sunk with a total depth of 32 kilometers to keep the pipeline supplied. On the line between Saratov and Moscow six big compressor stations are being built to maintain the necessary pressure in the pipe. Two 850-kilometer telephone lines, one copper and the other iron, connect the Yelshanka gas deposit with Moscow and the compressor stations.

When the pipeline is completed it will supply 1,350,000 cubic meters of methane to Moscow daily. The caloric coefficient of the gas is 8,400 and one cubic meter is equal to three kilograms of Moscow coal or five kilograms of firewood. The gas will replace 100,000 railway wagons and 500,000 truck trips used to carry firewood.

Later methane gas will be used as fuel for the taxis, buses and trucks running in Moscow. The major use to which the gas will be put, however, is the supply of dwelling houses, public buildings, schools, hospitals, bathhouses and laundries.

The pipeline begins in villages not far from Saratov and these sleepy villages have been turned into huge construction camps where work hums at all hours of the day and night. Barracks, dugout shelters and tents have mushroomed to house the workers and technical personnel. Former farm fields are now covered with derricks and the farmers themselves have turned into workers tapping the natural gas deposits found on their land. Like a sponge this new industrial site swallows up endless truckloads of metal tubing, oxygen cylinders, building materials and machinery.

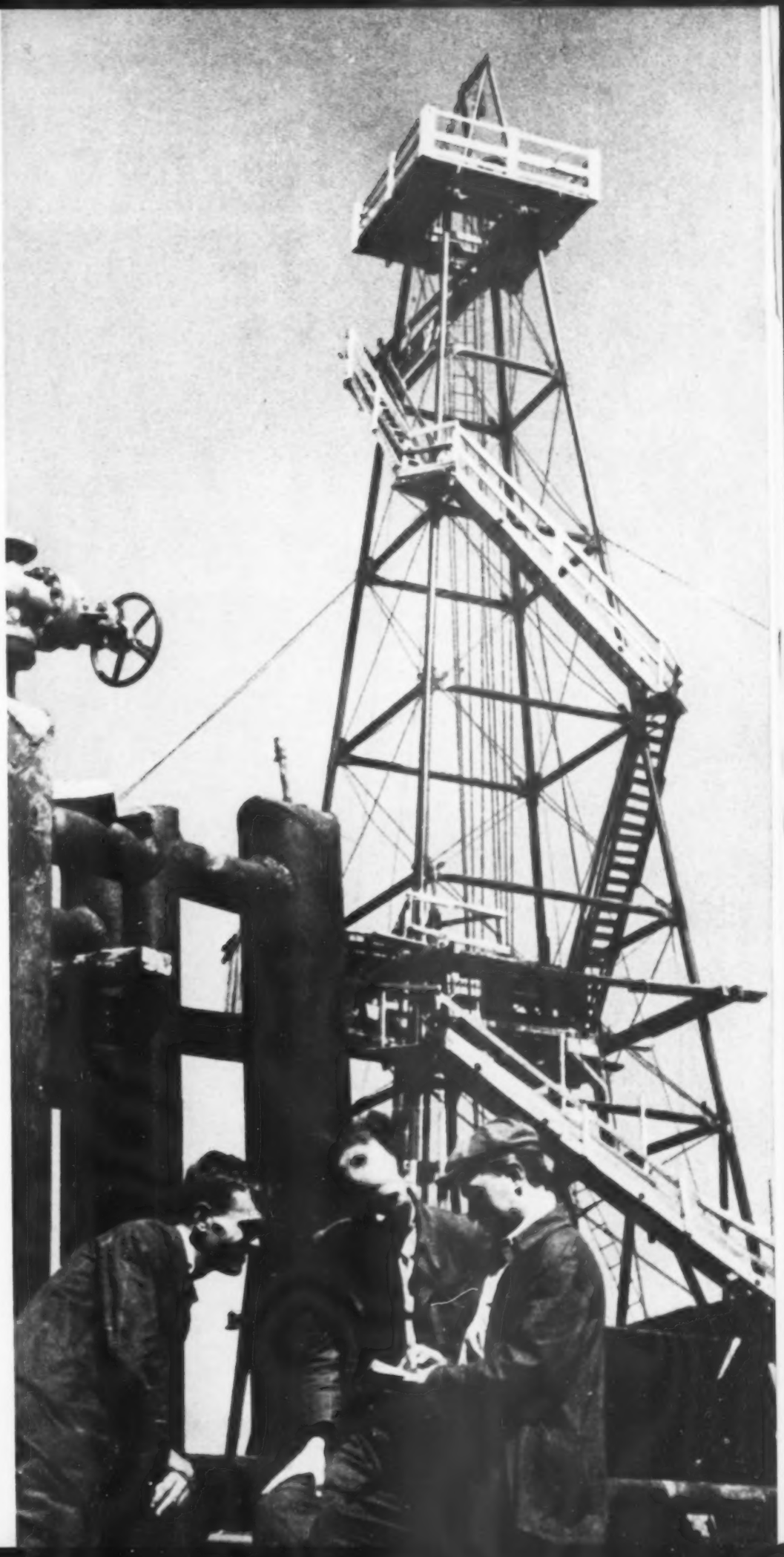
All this activity was spurred into life by the discovery in the Saratov area of tremendous reserves of natural methane. Geologists estimate that the Saratov methane reserves amount to 100,000 million cubic meters. One of the greatest of its kind in the world, the find is big enough to stand scores of years of the most intensive tapping.

The presence of methane gas in the area was first established in 1906 during the drilling of an artesian well on the left bank of the Volga. When the bit penetrated a few dozen meters into the ground a powerful blast hit the workers. That it was gas became clear when it caught fire from a match struck by one of the men to light his cigarette. After some difficulty, the fire was put out and the occurrence was treated as a mere curiosity. Nothing was done to develop the discovery until serious geological surveys were launched after the establishment of the Soviet Union. But even then the object of the search was oil not gas.

The next stage in the history of the development took place in 1935 when a geologist named Eugenie Kotova discovered traces of oil in limestone strata near Saratov. A year later she found bromine and potassium in spring water in the same area. In 1940 the young searcher's persistence was rewarded. She struck oil. Yet this was only the prelude.

The war was already on when in September 1941 oil drillers struck a gas well spouting about 700,000 cubic meters of methane a day in a field outside the village of Yelshanka. Wartime dictates interferred with the practical utilization of the gas, however, and the borehole was capped until a more propitious moment.

Geologists resumed surveying in the summer of 1942. At that time the German armies were hammering at Stalingrad and Saratov was in the immediate vicinity of the front line. Saratov industry, working full blast for the army, was seriously pinched for fuel, for the Donbas coal field was in enemy hands and the oil obtained in the Volga-Urals field was needed by the army. Yelshanka gas was called upon to save the situation.



Well No. 34 in the Saratov Field is a Producer of High Grade Crude Oil, the First Oil Producer in the Great Gas Field Discovered in 1941.

Mechanical Ditchers were Employed in Laying the Gas Line which was Electrically Welded.

Construction of the 30 km. Yelshanka-Saratov gas pipeline was started when the front was only 100-150 km. distant. Two months later the Saratov electric power plant and a number of its plants went over to gas fuel. During the 25 months this pipeline has been in use it has carried 400,000,000 cubic meters of gas, which has replaced 400,000 tons of coal. Thus it has practically paid for itself.

More than an economy measure, the gas pipeline has changed the very appearance of the Saratov industrial landscape. Formerly the heavy pall of smoke rising from its factory smokestacks could be seen miles away; today these chimneys give off no smoke and if one did not know that the fuel used is smokeless gas, it might not be realized that all these plants are in capacity operation.

To date 19 gas wells have been sunk, but only four of the smallest are in operation, and they more than satisfy the needs of Saratov; the rest, among them big producers able to yield up to five million cubic meters of gas per day, are awaiting the completion of the pipeline to Moscow.

Drilling in this district has been attended by some exciting incidents. In sinking borehole number 12, when the bit crunched through the last solid stratum at 800 meters, the gas burst forth with such tremendous force that the drilling equipment and pipes were blown out of the hole in a geyser of mud and gravel. The gas blast rose to a height of 60 meters with a roar audible miles away. Conversation in the vicinity was impossible and the workers engaged in plugging up the runway well had to stuff cotton in their ears to protect their eardrums from the deafening noise. Six days of hard work was required to get the well under control.

Saratov gas in many ways is accompanied by oil or water, and most frequently, by benzine fumes. Borehole number two yields pure light crude oil containing as much as 50 percent gasoline and kerosene.

Borehole number six spouts daily more than 1,000,000 liters of mineral water very much like that of Essentuki. Sparkling clear and pleasant in taste, it can be taken for stomach and intestinal disorders. Its fame has already spread so that hundreds of people flock to the spot to drink the water straight from the source. Nearby a spring yielding medicinal mineral water containing bromine, iodine and other salts has been found.

The Saratov-Moscow gas pipeline undoubtedly will spur the development of other surveyed gas deposits in the Soviet Union. It is estimated that the USSR's natural gas reserves occupy the second place in the world after those of the United States.

Although more than 200 natural gas deposits have been discovered in various parts of the country, so far only that found in the North Caucasus has had major practical significance. Here a power station has been built to operate on gas. Development of the deposits on the Kerch peninsula in the Crimea was started before the war, but was interrupted by the outbreak of hostilities. Now the work is to be resumed. A gas pipeline is projected in the Ukraine as well. It will supply Kiev and other cities.

The abundance of methane in many parts of the Soviet Union will stimulate the expansion of a number of industries, first and foremost the production of acetylene, synthetic rubber and silk, dyes, acetone, plastics, lacquers and certain medicinal substances.

To supply the present Moscow industrial plant thousands of trains are tied up carrying coal, oil, peat and wood. Especially has the consumption of wood increased during the war years. Saratov gas will eliminate the need to bring in wood fuel and provide a new fuel source that will spur the development of the capital's economy as a whole. Hundreds of thousands of Moscovites will be added to those who now are supplied with gas.

Moscow has grown greatly in the course of the last decade. With the launching of reconstruction in keeping with the plan, the old, crowded Moscow that took shape in the course of eight centuries began to give way before the new. Wide streets and avenues were laid and large modern buildings built. Asphalt took the place of cobblestones. Moscow River embankments and bridges were built anew. The Moscow Metro, which combines the last word in subway engineering and Soviet architecture, strikes the keynote of the past decade.

Guatemala's Proposed Oil Law

By RUTH SHELDON

Measure Drafted by Former State Department Petroleum Advisor Designed to Safeguard Rights of Operators and Avoid Excessive Taxation While Protecting National Interests—

ONE of the significant current contributions to the clarification of international petroleum thinking is a report to the Inter-American Development Commission on proposed petroleum legislation for Guatemala by Max W Thornbrg, international petroleum affairs consultant.

With machete-sharp logic Mr. Thornburg has cleared a great area in the jungle of petroleum legislative approaches which are choking the growth of orderly world oil development.

Through the medium of designing a petroleum law for a specific country which has not yet produced a teacupful of oil but which has excellent possibilities, Mr. Thornburg has created a challenging new yardstick for any country to use in measuring the merit of its own oil objectives and how they are being or can be accomplished.

Guatemala's request for this report is a part of its policy of economic reform. American experts have also advised them on new laws for money and banking, small industry development, mining, price stabilization and other phases of modern democratic administration. Guatemala's request for oil guidance also recognizes the fact that consideration of world oil factors is indispensable in determining any individual country's national policy.

There is a universal desire to avoid the conflicts of the past which have made world oil development anything but orderly. This desire was evidenced by Venezuela in the formation of its 1943 petroleum law — the first time oil companies and a government attempted to chart a mutually profitable and amicable course together. Conferences on the Anglo-American oil treaty during the past two years have been an effort to initiate international accord on oil. The effort appears to be bogging down in internal American politics. However, both the need for the orderly development of foreign oil and the determination to have it, even in the absence of world agreements, is demonstrated by the initiative of Guatemala. Several other countries, such as Panama, also plan independent action along the same lines.

The proposed Guatemalan law is similar in many respects to the 1943 Venezuelan law, but is more advanced in certain provisions as it cures a number of evils retained in the Venezuelan law through compromise. This, of course, was possible inasmuch as Guatemala's oil history is just beginning whereas Venezuela's had a turbulent and complicated past which posed special problems. Also, three years operation under the Venezuelan law have brought to light flaws not foreseen at the time of its enactment.

Some of the concepts in the Guatemala draft have never been included in any petroleum law and may prove revolutionary in their effect upon future revisions or creations of petroleu laws in other countries.

Of primary interest is the recurrent theme of the proposed law which is that the nation's best interests are served by constantly keeping in mind that it is the total of all charges, against the industry that determines its success. For the first time in any oil law it is provided that no other special taxes or levies other than those provided for in the law can be applied to the concessions; nor can any municipal or other local taxes or levies be made against them. Oil, of course, would be subject to such federal taxes as are applied to any industry in Guatemala.

The specific charges against the industry provided for in the law are intended to be reasonable from the industry viewpoint and at the same time assure the nation an equitable share in the development of its natural resource. The sources of oil revenue to the nation are concentrated on a 12½ percent royalty. The few other fees or taxes are designed not as revenue but either as nominal charges to defray government costs in administering the law or to serve certain desirable purposes such as in the case of the annual surface tax on expolitation concessions. This tax on a sliding scale prevents holding reserves without reasonable development by increasingly heavy taxation and at the same time encourages production by providing that the concessionaire can deduct from such taxes (above 75 cents an acre) a sum equal to the amount of royalty he pays the government.

The simplicity of the taxation clauses of the proposed law is in striking contrast to the complicated situation in most countries where the industry is subject to hundreds of miscellaneous taxes in addition to those provided in the nation's petroleum legislation. The average government usually thinks of royalty as its only income and is constantly trying to readjust this item upwards without taking into consideration the revenue it receives from all other taxes.

Mr. Thornburg points out in the preface to the proposed law, "In all cases it must be remembered that it is the total cost per barrel loaded for shipment which, in relation to the world market, will determine the maximum level of exports." By streamlining taxation and keeping the per barrel cost to a reasonable minimum the nation stands to gain the most possible through its percentage royalty on the volume of exports.

Another major oil problem which Mr. Thornburg tackles forthrightly for the first time in any oil law is the possibility of expropriation. The Mexican and Bolivian experiences in this field make private oil companies extremely sensitive to the subject. For example, development of new lands in Venezuela was delayed for five years as the companies were afraid to take out concessions under the old petroleum law which they felt contained clauses which were an invitation to expropriation.

Mr. Thornburg does not confine himself to seeing that there are no such clauses in the proposed Guatemala law. He specifically lists the sole causes for cancellation of the various types of concessions by the federal executive. These are for failure to exploit an exploitation concession with reasonable diligence; failure to pay the annual surface tax within one year of its due date; failure to begin work on a manufacturing

or pipe line concession within one year; legal expirations; legal renunciations by the concessionaire; ro acquisition by a non-eligible concessionaire. The law further provides that the concessionaire shall be given reasonable time to remedy any such situations. Although this does not prevent expropriation, which is the inalienable right of any soverign nation, it limits the causes for cancellation of rights which other laws do not mention.

Another new concept in the proposed Guatemalan law is the specific definition of what constitute special advantages which the nation may consider in deciding to whom to award an application for an exploitation concession. The Venezuelan law merely states that the nation can consider special advantages without specifying what type. This generality led to an unfortunate competition in royalty rates. Companies bid against each other for national reserves offering as "special advantages" royalties as high as 33-1/3 percent. If and when production is eventually obtained it is patent that over any length of time this is an impossibility high royalty rate in combination with other charges in Venezuela. Companies felt secure in bidding such high royalties as the Venezuelan law provides that royalties may be reduced if it is proven that due to production costs and royalty burden it is impossible to produce the oil economically.

Mr. Thornburg not only specifies that no increased royalty may be offered as a special advantage, but that the royalty relief clause included in the Guatemalan law cannot be applied during the first five years of a concession. The latter clause discourages the concessionaire from committing himself to an unwarranted amount of special advantages. He lists as special advantages which can be offered — cash payments in lump sums or installments, oil payments, (in effect, royalty, but more flexible), special projects to promote education, public health, social welfare or other public services; or special works obligations aimed to speed up development of the concession.

As Mr. Thornburg points out, the purpose of such special advantages is "to allow the State to determine the real value of the rights it has to grant, by competitive or negotiated offers, as the going value of such rights increases with the discovery of oil or the general development of the industry. At the same time the rights of initial exploration or exploitation concessionaires to continue under the terms of this law are protected against change. By this means newcomers who have not participated in the initial risks of exploration and early devolopment, are made subject to appropriately higher contributions."

Another important new concept is the statement that Guatemalan citizens must be given preference in all types of employment within the country, insofar as they are qualified to perform the work with reasonable efficiency. The companies are obligated to maintain training programs and to advance Guatemalans as they demonstrate their ability. The companies are not hindered from using employees of their own selection for any work which requires specialized training. The government can enter special agreements with the companies for such training and advancement which relieve the companies from corresponding obligations under the labor code or other laws.

These employment provisions in the law should go far to prevent the occurence of a situation which has been troublesome in other countries. Employment of nationals has become a sore point with governments and foreign labor unions and negotiations on this point have inevitably become complicated. A clear statement of the obligations in the petroleum law itself will act as a preventive to such troubles.

Obligations are also placed upon the concessionaire to commence work on any type of concession with reasonable promptness and to prosecute it with reasonable diligenct. Mr. Thornburg warns that while this is a proper concept, "its administration by government officials who are not experienced in the oil industry could make it a fruitful source of controversy". He suggests that the regulations covering this clause be drawn with great care and be limited to explicitly defined requirements which experience has shown to be important.

The law in many ways is more moderate than that of Venezuela due to the fact that Guatemala, with no production at present, wishes to make itself attractive for oil investment. Favorable inducements are the nominal taxation, standard royalty, freedom from import duties for the first ten years of operation, no export taxes and no refining requirements.

Such inducements are deemed necessary as although a relatively large part of the country seems to be geologically favorable for oil, the largest and most important area, the jungles and swamps of Peten, present almost all the physical obstacles known to foreign oil development. Only a limited area in the region of Lake Izobal near the east coast offers comparatively easy exploration and exploitation conditions.

Guatemalan exploitation concessions would run for thirty years as compared to forty in Venezuela. This was a stipulation of the government, but as Mr. Thornburg comments, thirty years should provide ample time for a company to develop its properties profitably inasmuch as it has the perferential privilege of renewing the concession, if the government does not wish to take over the property itself as the law provides it may.

The terms of the law discourage promotional activities, but do not preclude the obtaining of concession by qualified small companies. For example, Mr. Thornburg estimates that the total probable favorable area in Guatemala for investigation and concession is approximately 8,000,000 acres. The maximum size of any one exploration lot is limited to 100,000 acres, which would provide for 80 possible concessions. The government can grant more than one of these lots in one concession, but there would be room for a number of companies in the final distribution. Exploration obligations provide that a company must post a bond for and spend a minimum of ten cents an acre per year (including equipment, salaries, test drilling, etc.) which would mean that on a 100,000-acre holding, $10,000 per year in actual exploration work must be committed. This amount is considered to be well within the normal exploration budget.

Mr. Thornburg points out that "it is not probable that small companies will choose to undertake the initial exploration of large and difficult regions, because of the high cost and risks involved, and because small companies ordinarily do not have the technical resources which are necessary to conduct such programs in the modern way. After a certain amount of such work has been done, however, and particularly after parts of certain promising areas have been relinquished (a stipulation in the law) by the companies which did the original exploratory work, there are many advantages, from the national point of view, in having small companies participate on a scale commensurate with their resources."

An analogous situation is presented by Eastern Venezuela where the major companies spent $44,000,000 in exploration and development before the first barrel of oil was shipped. Smaller companies, such as Barnsdall and Phillips did not apply for concessions until 1944 when favorable national reserves relinquished by the majors were opened for bidding. However, it is possible that in the smaller country of Guatemala and in view of declining discoveries in the United States smaller companies or syndicates of small companies may find it feasible and profitable to engage in initial exploration work.

There are certain provisions in the proposed law which are peculiar to the present Guatemalan situation. The Revolutionary Constitution of March, 1945, provides that all exploitation concessions must be approved by the Congress. The law conforms to this but protects the concessionaire by stipulating that congressional approval of an exploration concession is also approval of the inherent right of the concessionaire to turn all or part of it into an exploitation concession if he so desires.

Copies of Mr. Thornburg's report and proposed law may be obtained from J. Rafael Oreamuno, Vice Chairman, the Inter-American Development Commission (an agency of the Pan American Union) 2400 16th St. N.W. Washington, D.C.

The entire law is predicated on the assumption that the Guatemalan government will change the only serious obstacle to oil development in the country. The Constitueion provides that oil development may not be undertaken by any company in which less than a controlling part of the capital is Guatemalan. There is no available oil capital in Guatemala and until the Constitution is modified it is unlikely that any substantial interests would commit themselves to development under the present terms. Mr. Thornburg, who made three trips to Guatemala in connection with this report, recommends that the proposed law be enacted as soon as possible, even before changing the Constitution, and that the necessary regulations be formulated and the administrative organization be created. The time required to do this, which might take a year, would be of tactical advantage to the nation.

It would given national capital an ample chance to prove that it could or could not offer a sound development program under the present law. In addition, it would afford time in which the social and economic conflicts between the conservative wealthy landowners and the liberal reform elements now in power could, as Mr. Thornburg puts it, "define themselves more fully before launching a large scale program which, with substantial foreign interests involved, must remain relatively inflexible over a long period."

Mr. Thornburg's preface to the proposed law is of particular interest. Titled "The Design of a Petroleum Law" it is a statement of objectives and principles to be understood and observed in petroleum legislating. Mr. Thornburg, former vice-president of the Standard Oil Company of California with broad working experience in the Middle East, is also former Petroleum Advisor to the State Department and has worked intimately with the oil problems of every country during the war years. Few experts are better qualified to formulate such a design.

Mr. Thornburg carefully explains conflicting oil philosophies, warns against pitfalls, and recommends courses of procedure most beneficial to the nation as well as to the company, each of whose success in the final analysis is dependent upon the other's. Companies as well as governments may profit by studying his report.

He points out the advantages which accrue to a country through the development of a prosperous oil industry — new sources of employment and vocational opportunities, improved sanitation, medical care and educational facilities, economic advancement of related industries in the country, development of new roads and communications, introduction of modern methods and materials.

He emphasizes that to accomplish this the law must be so designed that one objective does not conflict with another, that burdens must not be imposed upon the industry which would prevent its rapid and successful development.

"The most important single factor influencing the value of an oil industry to the Nation and to the company is likely to be the volume of oil exported," he said, and points out that it is incumbent upon both to maintain the cost per barrel of exportable oil in a favorable relation to the world market.

By various legal devices the government can assure competition to avoid monopoly; however, competition must work both ways. The company is entitled to the benefits of successful competitive effort. He feels that "the role of 'risk capital' in the economy of world oil, and the mechanism through which it is rotated, in a manner of speaking, for the benefit of oil consumers throughout the world, and for the benefit of nations which cannot by themselves risk the costs of oil exploration and development is little understood.

He points out that the current state of the national budget in a country plays a determining part in fixing the terms under which oil development is undertaken. If the treasury situation is favorable the country will take a more conservative view. If immediate cash is necessary the government may be obliged to make more liberal concessions to obtain it. He warns that these arrangements represent exchange of real values "and should not be regarded in retrospect as an example of selfish exploitation by an oil company calling for later retribution".

He advises the government that since oil re sources are known to be limited "a sound fiscal policy would recognize some part of national oil receipts as representing a wasting asset, and either mark it for reinvestment in permanent works or set it aside as part of capital reserve instead of considering it ordinary revenue available for current expenses."

Mr. Thornburg's concepts are well expressed in the following, which also outlines the approach to the problems:

"At this point it can be observed that while it is desirable that any law designed as a basis for a long range economic program be as little as possible subject to change in its essential provisions, it is necessary that it be shaped initially in such a way that it wi'l be grafted firmly into the economy of which it is to be a part. It is this requirement that makes it impossible to life even a successful oil law from its setting in one country and lower it into a different foundation in another one.

"From this requirement also follows the fact that changes in the law will become necessary, as conditions with which the law must deal change in the normal way of human affairs. The important thing is that when initial provisions are designed to fit initial circumstances, recognition be given to the kinds of changes which are likely to become necessary later and freedom allowed for evolutionary growth without impairing the validity of initial principles. As the tree grows the limbs and branches may be shaped to suit the space, but the trunk and roots must not be destroyed."

SALIENT FEATURES

Of Recommended Guatemalan Petroleum Law

General Principles:

(1) All natural deposits or occurences of Petroleum belong to the Nation, inalienably and imprescriptibly.

(2) Everything relating to petroleum exploration, exploitation, manufacture, refining, storage and transportation by special methods is of public utility and is governed by this law.

(3) The State may grant exclusive exploration or exploitation concessions but no exclusive rights for manufacturing or transportation. All exploration and exploitation concessions must be approved by Congress, but manufacturing and pipe line concessions require only the approval of the Federal Executive. Although exploration and exploitation concessions are handled separately, it is obligatory for the State to grant an exploitation concession to the holder of an exploration concesion, for such parcels as he may legally select for exploitation.

(4) The Federal Executive may stipulate special advantages, in addition to those required by law, to be given by the concessionaire for exploration or exploitation concessions on National Reserve areas, or manufacturing or transportation concessions. No such stipulation can be made in connection with obligatory concessions or exploration or exploitation concessions on free areas. (National Reserve areas are any which have been included in an exploration or exploitation concession but which subsequently become available by having been renounced according to concession law. Special advantages may include cash payments, made singly or in installments over a period of time or based upon the quantity of oil produced; undertakings for promotion of education, public health, social welfare or other public service or works obligations aimed at the

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Map of Bolivia Showing Route of Proposed Pipe Line

Expanding Oil Facilities in Bolivia*

DURING the year 1945 Yacimientos Petroliferos Fiscales Bolivianos (YPFB) made a series of studies directed to the solution of the problem of developing Bolivia's self-sufficiency to supply the country's needs for hydrocarbons. These studies were accomplished with the collaboration of North American companies specializing in certain phases of the industry, such as the Foster Wheeler Corporation and Williams Brothers Company.

Previously, it was known that the principal factor affecting this problem was transportation. After a complete study of all the plans that had been suggested for the solution of the problem, and after a certain critical analysis of conditions, certain conclusions were reached which will be considered later.

The studies were started with a survey of the possibilities of production in the different oil fields, and it was established that the only field in the country that offers favorable conditions for a partial solution of the problem faced is the Camiri oilfield, the known reserves of which have been estimated at twenty million barrels.

The most recent geological work undertaken in this field proved that its potentiality will justify the investment necessary for its exploitation on a commercial basis. The other fields now in production either due to natural conditions or to their geographical position, are not adequate to supply the country's demand in the amount required. The Sanandita field is actually much smaller than it was expected to be. The Bermejo field is too far from the principal centers of consumption and cannot be used at present to meet the country's needs. Besides, YPFB has not been able to determine the exact potentiality of this field, because of the complexity of its geological features.

Having selected the most adequate oilfield for supplying the needs of the country, the next problem to be solved was that involving transportation which presented the greatest difficulties. This had been examined in 1941 by the Bohan mission and the solution suggested was the intensive development of Sanandita and the transportation of crude oil by railroad through the Argentina route to the Altiplano where a refinery was to be installed. Now that the true potentiality of this field is known this plan has been discarded.

The Kemnitzer plan was based on more exact data. It recommended the development of Camiri as the principal oilfield. To solve the problem of transportation it suggested the construction of a pipeline to Santa Cruz and the erection of a refinery at this point, so that the oil markets in the Altiplano could be supplied by trucks through the road Cochabamba — Santa Cruz now being built. The objection to this plan is the high cost of transportation per ton of oil.

YPFB had considered as the most plausible solution, the construction of a pipeline from Camiri directly to the Altiplano. Several preliminary projects were undertaken with the purpose of determining the approximate cost of a pipeline between Camiri and Sucre. Subsequently, these projects were enlarged with the extension Sucre-Oruro through Macka. These reports were prepared simultaneously by three different engineers and the conclusion reached by all of them was that the cost of a five-inch pipeline between Camiri and Sucre would be between $3,500,000 and $4,100,000, and that the average cost of transportation to supply the markets of the Altiplano would vary from fifty cents to one boliviano per ton — kilometer. These calculations were received with skepticism, however, and it was agreed to engage the services of specialists to make a comparative study of possible routes. The firm selected was the Williams Brothers Corp. which suggested five possible solutions. From the report submitted by this company, it was decided that the most adequate plan from an economic standpoint was the construction of a pipeline following the route from Camiri to Cochabamba.

Similarly YPFB, in conjunction with the Bolivian Development Corporation, engaged the services of Foster Wheeler Corp. of New York to plan the construction of a refinery suited to the different types of crude oil produced in the country. This company submitted a complete report analyzing the possibilities of different locations and types of equipment. The places suggested as refining sites were Santa Cruz, Cochabamba, Sucre and Oruro. YPFB decided that the most adequate refinery would be one that could produce in addition to ordinary by-products of oil, aviation gasolines of high octane, lubricants, greases for industrial purposes and paraffin.

The program of production in Camiri includes the drilling of 29 wells which are expected to produce a minimum daily average of approximately 3,000 barrels (495 M³). This program of production will not face any difficulty regarding the capacity of the field. It would be advantageous, however, to discover other sources of oil in the neighborhood of Camiri. With this purpose in mind, YPFB has started some exploratory work in the formations of Guairuy. These formations present promising geological conditions, and the depth at which it is expected to find petroleum is approximately 500 meters, compared to 1,000 meters in Camiri. In case the exploratory work offers satisfactory results, part of the drilling program at Camiri will be transferred to Guairuy.

The site selected for construction of the refinery was one recommended by Foster Wheeler at Cochabamba. The cost will be approximately $7,000,000 for an output of products in the quantities given below:

PRODUCTS	AMOUNT CU. METERS
Ordinary gasoline	40,000
Aviation gasoline	5,200
Kerosene	2,480
Diesel oil	14,300
Lubricants	3,350
Greases	320
Paraffin	480
Asphalt	812
Fuel Oil	6,080
Gas	6,240
Losses	738
	80,000

The operation of the refinery is based on a mixture of 50 percent each of the types of crude from Camiri and Sanandita, with the purpose of producing quantities of by-products corresponding to the nation's needs, and at the same time of using Camiri's production. This accounts for the need of obtaining a type of crude more similar to that produced in Sanandita, and for the exploratory work taking place at Guairuy. The refinery however would not be able to produce all the products in the amounts required, since in order to supply the Republic with the amounts of fuel oil and diesel oil needed, it would have to produce three times the amount of gasoline required by Bolivia. Because of high transportation costs this gasoline would find no markets outside of the Republic, but, if the domestic demand for gasoline continues to grow, as is likely, the refinery will be able to increase gradually its production of heavy by-products. Moreover, if the Guairuy field yields a type of oil similar to that of Bermejo, this situation will greatly improve.

The refinery has been planned to process lubricating oils and greases in the quantities required to meet the national consumption. The refinery will produce the amount of aviation gasoline needed in the country.

Inasmuch as the complete financing of the refinery is not possible at the present time, only a

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*From Report of Yacimiento Petrolifero Fiscales Bolivianos (YPFB)

ROMANIAN INDUSTRY

Emerges from WAR BLACKOUT

By Mihail Pizanty

Despite Lack of New Equipment Urgently Needed, Substantial Recovery in Petroleum Activities Took Place During 1945 — Joint Soviet-Romanian Company Established — Oil Bears Large Share of Reparations.

Mihail Pizanty

THE scars inflicted upon the Romanian oil industry will not soon be effaced. Forced into collaboration with Nazi Germany in 1940 and dragged into the war in the following year in violation of its past alliances and sympathies the country and its chief industry became the victim of the despoilers who occupied it and a target of attack by Allied aerial forces. These bombing assaults became more frequent and destructive after April 1, 1944. Being directed chiefly against oil installations, refineries, storage farms and transportation facilities they converted many plants into what seemed to be only useless masses of wreckage. Yet from August 23, 1944 when the army and the nation turned toward the United Nations the work of restoration has gone on despite inability to obtain needed materials and the necessity of using old and worn out equipment for making repairs. While the performance of these patched-up plants is far from efficient, the results obtained are noteworthy under the circumstances.

In this connection it may be worth mentioning that the production of oil in Romania is a long established industry. While Americans date the start of the commercial era in oil from the sinking of the Drake well in 1859, records show the existence of early distilleries of petroleum in Moldavia about 1840 and a refinery to supply Bucharest with oil for street lighting was built in 1856. Production of crude oil has passed through successive stages from grubbing,draining and hand-dug wells to modern methods of drilling. The area of productive development extends along the southern and eastern slopes of the Carpathians in the districts of Prahova, Dambovita, Buzau and Bacau. Drilling has been done in other areas but has not been extensive enough to give conclusive results. Production had reached an annual volume of nearly two million metric tons at the beginning of World War I and after the close of that conflict continued to rise up to 1936 when the peak output of 8,704,000 tons was reached. Production by districts from 1939 to 1945 has been in thousands of tons:

Table I
1939-1945 Production of Romanian Fields

District	1939	1940	1941	1942	1943	1944	1945
Prahova	3990	3846	3742	3863	3472	2293	3130
Dambovita	2162	1884	1635	1722	1695	1130	1350
Buzau	42	37	35	30	57	53	110
Bacau	46	43	41	50	49	49	50
Total	6240	5810	5453	5665	5273	3525	4640

Oil production and refining in Romania throughout its modern development has been an international enterprise enlisting the attention of British, French, American, Belgian, Dutch and other foreign capital as well as that of domestic investors. Prior to the Hitlerite drive toward southeastern Europe about two-thirds of the capital investment was held by nationals of the countries named while approximately 30 percent was in the hands of Romanians. When the Nazis swallowed Czechoslovakia the banks in Prague were forced to hand over to their new masters the oil company securities which they held and the Germans gained their first substantial foothold in Romanian oil through control of Petrol Block. After the occupation of Belgium and France the same system caused the majority shares of Concordia, Colombia and Foraky Romaneasca to fall into German hands. After Romania was brought within the Hitler orbit these and other holdings were consolidated in Kontinentale Oel Berlin which was designed to become a Nazi monopoly controlling the oil facilities of German dominated Europe. During the period of Nazi suzerainty Kontinentale acquired shares representing a face value of 1,750 million lei or 12.96 percent of the total oil investment in Romania as compared to 0.35 Percent under German control prior to the war.

According to an agreement for economic collaboration signed in Moscow on May 8, 1945, the government of the Soviet Union assigned the companies Obiedinienie Ucreneft and Soyusnefteksport, to which the shares previously held by Kontinentale were transferred to participate in the foundation of a Soviet-Romanian oil company, Sovrompetrol, with a capital of 5,000 million lei at par of exchange of 1939 to be subscribed by the two groups in equal proportions. By royal decree dated July 19, 1945 shares of eleven oil companies amounting to 1759.8 million lei were transferred to the USSR to make good war damages perpetrated by the Germans.

Under the agreement for the organization of Sovrompetrol the Soviet group contributes as its share of the capital stocks valued at 1,758.2 million lei and equipment for exploration and exploitation amounting to 740.2 million lei, thus completing its quota of 2,500 million lei. The Romanian group provides shares of Creditul Minier and Redeventa at a value of 1,100 million lei, fields belonging to the state or to be taken over and 50 percent of the royalties due to the state calculable at the value of 1939. As a result of these changes the holdings in the Romanian oil industry by nationalities stand as follows:

Table II
Domestic and Foreign Ownership of Romanian Oil Industry

Nationality	Million of Lei	Percentage
Romanian	3,841	27.34
British	3,162	22.51
USSR	1,760	12.53
American	1,728	12.30
French	1,496	10.65
Italian	533	3.80
Belgian	480	3.42
Dutch	229	1.63
Swiss	170	1.21
Other Nationalities	647	4.61
	14,046	100.00

While the Germans were in control they attempted to enhance production and in 1942 they extended drilling by 36 percent over the preceding year giving a total of 344,000 meters. Crude oil output increased only 212,000 tons or three percent, however. In 1943 drilling continued on nearly the same scale but production decreased by 392,000 tons or approximately seven percent. It was in that year that Allied air raids began to affect operations and these became more frequent and destructive particularly after April 1, 1944. Table III gives an indication of the effect of air attacks during that period.

By the time the Nazis were forced to relax their grip repeated bombings had reduced production by nearly two-thirds and refining operations had dropped to less than one quarter of their March volume. Estimated on the basis of replacement costs the monetary damage was placed at 26,790 millions of lei.

Rehabilitation of the industry after the tremendous demolition inflicted during the final months of the war has been attended by great difficulties and progress necessarily has been slow. The more modern and efficient refineries were the favored targets of attack and suffered most seriously. Since 1939 the refineries have been unable to introduce new equipment or to take advantage of new processes. Consequently, there is great need for all kinds of machines and supplies and the country looks to its former connections in the United States, Britain, France, Belgium and Czechosolovakia, to provide this equipment as soon as may be possible. Equipment promised by the Russians probably will be applicable mainly to drilling and production and will be needed by Sovrompetrol for its own operations. Working with used equipment and parts recovered from bombed installations the operators have been able to effect substantial recovery and to restore about 50 percent of the loss in production suffered during the war. Table IV shows the monthly course of the industry during the past year.

In the period of normal operation preceding the war roundly one-third of the oil produced in Romania was consumed domestically and two-thirds was exported to various European countries. Due to changes arising from the war and the leading part played by Romania in the payment of reparations extensive alterations have taken place in this trade. Under the terms of the armistice convention half of the annual sum due on reparations must be supplied in the form of petroleum. This requires about 1,750,000 tons of a value of roundly 25 million dollars. Owing to the inability of the state to deliver the full quantity of other products due additional quantities of oil had to be provided. About 100,000 tons also was sent to the USSR in payment for cotton and other commodities received in trade.

Operations by companies are shown in Table V

Table III
Effect of Air Raids on Romanian Operations

Kind of Activity	March	April	June	Sept.	Dec.
Drilling (thousands of meters)	17.4	15.1	10.5	5.1	4.3
Output (thousands of tons)	424.2	343.4	134.0	124.1	353.0
Treating (thousands of tons)	377.3	180.5	88.0	168.2	400.5
Home Consumption (thous. of tons)	162.1	63.4	69.0	40.4	89.0
Export	261.3	137.6	99.6	74.6	283.4

Table V
1945 Production of Romanian Oil Companies

Companies	Crude Prod. Tons	Runs to Stills (tons)
Astra Romana	1572,043	1411,423
Steaua Romana	443,163	499,778
Concordia	555,452	534,218
Romano-Americana	492,317	578,765
Groupe Unirea	369,886	371,645
Creditual Minier	253,590	148,690
Colombia	338,685	473,334
Prahova	203,725	118,897
I. R. D. P.	83,020	
"EPS" (Petr. Romanesc)	53,756	
Dacia-Starnaphta	24,030	121,013
Roraj Lemoine	24,833	
Sondrum	21,136	
Moldanaphta (Danube oil)	18,627	
Redeventa	39,622	
Other Countries	146,115	506,073
Total	4640,000	4763,836

Among other changes that have taken place one of the ten-inch pipe lines leading to Giurgiu has been removed to the route Faurei-Braila-Galati to the length of one hundred meters crossing the Pruth to Reni. The annual capacity will be about 640,000 tons adding greatly to the quantity that can be moved by tank cars. Completion of the pipeline to the gas fields of Transylvania will bring to Bucharest a daily supply of 500,000 cubic metres, sufficient for all requirements.

Imperial Refinery Changes

F. C. Lantz, manager of the St. Clair Processing Corporation since 1942, has been appointed assistant general manager of refineries for Imperial Oil Ltd. Mr. Lantz joined the company at the Sarnia refinery in 1922. He has served as superintendent of the refineries at Calgary and Regina, Canada, and Barranca Bermeja, Colombia.

Imperial has made a number of other changes in the refinery management group recently. R. L. Dunsmore, formerly manager of the Montreal plant, has been appointed coordinator of refineries for International Petroleum Co., Ltd. Mr. Dunsmore joined Imperial in 1919 as assistant engineer at Sarnia. He has also served in refineries at Calgary, Ioco, Halifax, Montreal and at Talara in South America.

The new general superintendent at Montreal is Allan Harrop, formerly superintendent at Sarnia. He has been with Imperial since 1925 serving at Talara, Regina and Calgary. Associated with him as superintendent at Montreal will be Charles Scrumgeour formerly superintendent at Halifax. At this latter plant R. D. King has been promoted from assistant to superintendent.

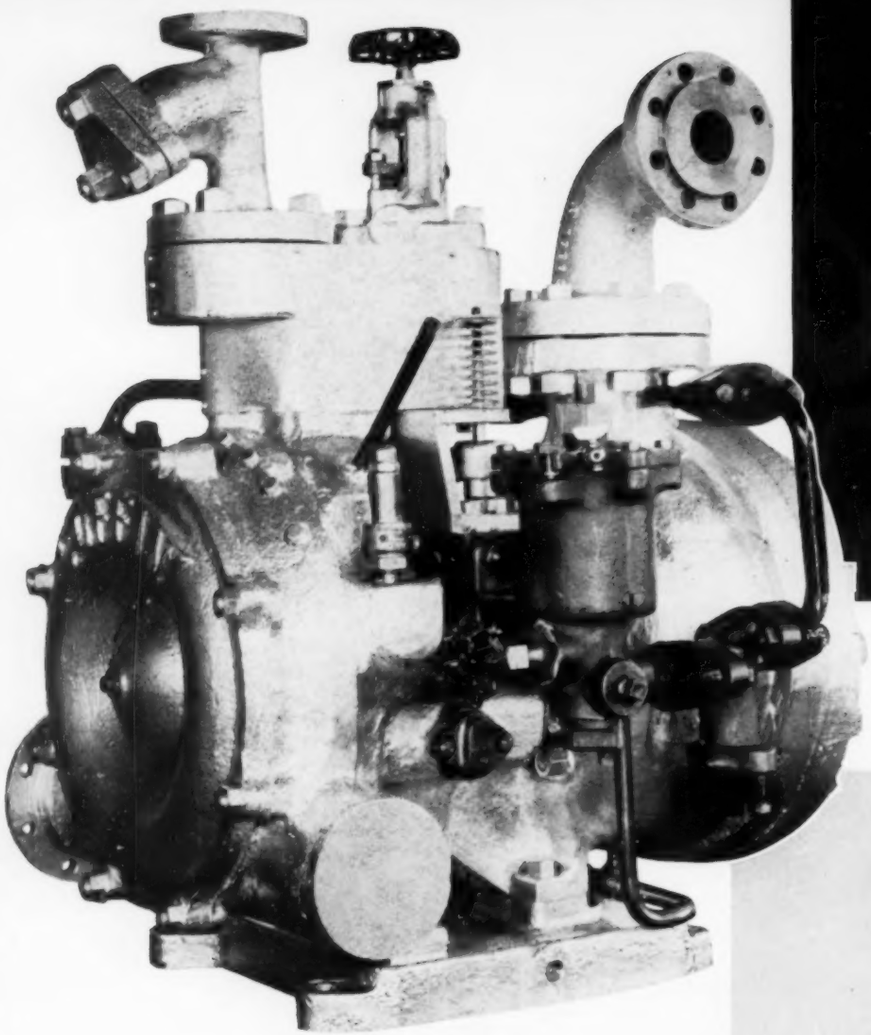
Dr. J. L. Huggett is the newly appointed superintendent at Sarnia succeeding Mr. Harrop. He has been assistant manager of the St. Clair Processing Corporation since 1942. Dr. Huggett was with Imperial before World War I and after the war attended the Universities of B. C. and Paris graduating from the latter as a Doctor of Science.

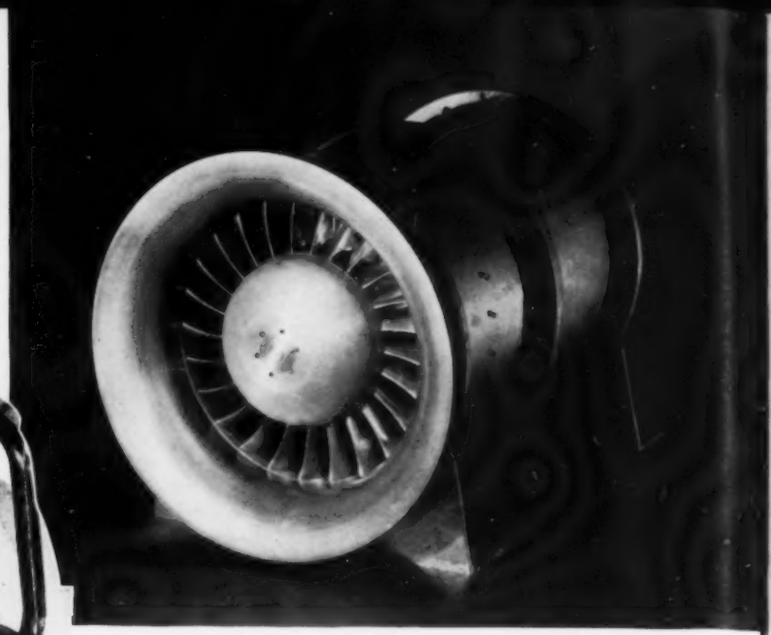
Buys Research Site

STANDARD OIL COMPANY of Ohio has purchased an 84-acre site near Cleveland for development of a research center. Construction will not be undertaken until 1947.

Table IV
Summary of Romanian Oil Operations in 1945
Statistics by Months During 1945

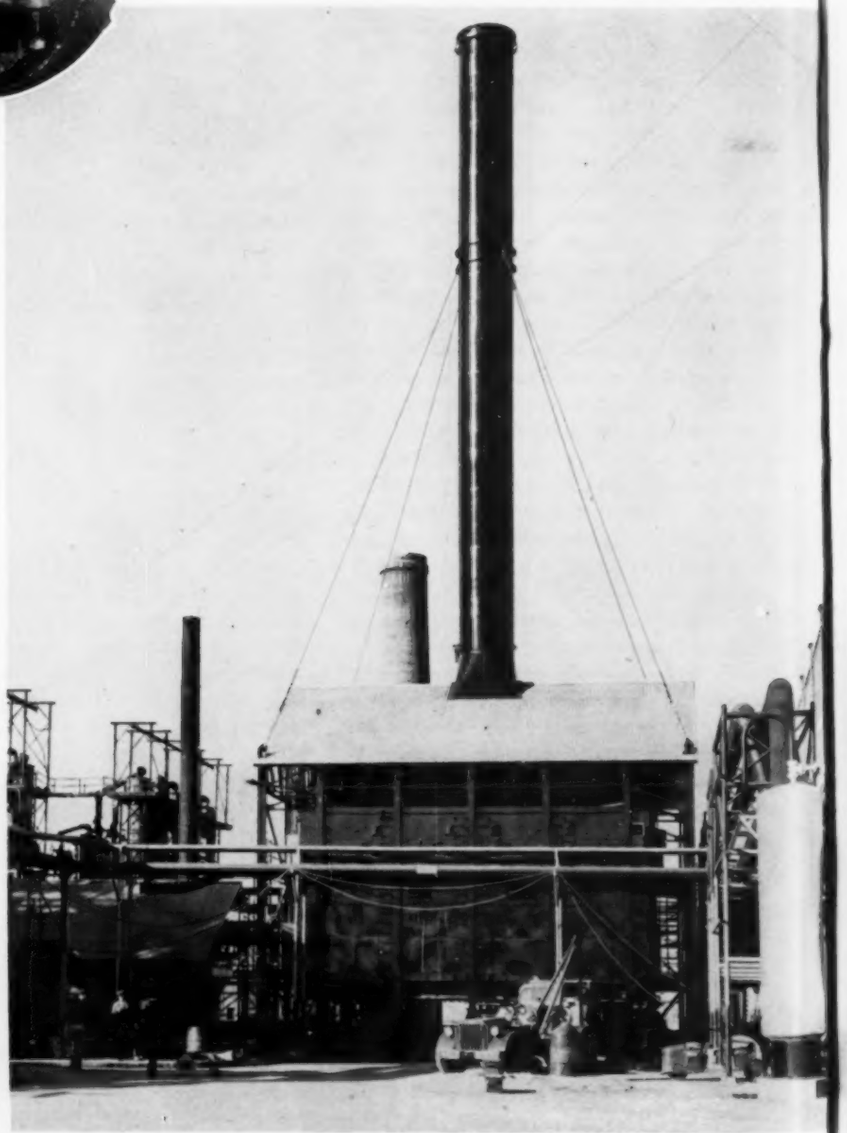
Operations	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Drilling (metres)	3,450	5,250	12,000	15,000	20,800	17,300	21,000	17,800	14,600	14,000	9,600	9,200	160,000
Production (1000 tons)	377	344	388	395	407	392	403	403	388	395	380	368	4,640
Consom inter (1000 tons)	132	119	128	98	92	93	100	105	114	138	127	141	1,387
Exportation (1000 tons)	216	219	330	297	326	309	294	278	238	221	204	168	3,100





Above: Axial-Flow Blower Built by Buffalo Turbine Corporation for Speeds Above 3500 RPM.

Left: Single-Stage Turbo-Pump with Built-in Control for Constant Discharge Pressure. Maximum Head 1800 Feet at about 7,000 RPM.



Above: Portable Heater for Service Requiring over 60 Million Btu/Hr Used to Reduce Shut-Down Time in Major Repair Operation.

Left: Air-Conditioned, Sound-Proofed Control Rooms Now are Being Finished in Light Colors and Studied for Adequate Illumination.

NEW DEVELOPMENTS IN OIL REFINERY EQUIPMENT

BY

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DURING the war there were many new developments in petroleum refinery equipment and materials of construction which were not generally publicized because of war secrecy orders. In addition, many of these developments were highly specialized uses in connection with the prosecution of the war. Now that censorship has been lifted on most of this subject matter, many of these new developments are finding application in present refinery construction programs. It is the purpose of this article to outline in a general way some of these applications. To cover this field completely is beyond the scope of this paper, but it should furnish subject matter for many additional interesting papers. The types of refinery equipment covered include fired heaters, pressure vessels, pumps and compressors, heat exchangers, and instruments which are essentially the major pieces of equipment in refinery process units.

Fired Heaters:

During the war in connection with the 100 octane aviation gasoline program, synthetic rubber production, explosives manufacture and many other war products from petroleum, a large number of fired heaters were designed and installed. Much of this construction was limited by scarcity of essential materials of construction. In many cases furnace tubes were used of metals which were the best available for the service although not entirely adequate. Heaters were designed for service using temperatures higher than previously attempted, and in some cases at pressures considerably higher than normal practice up to that time. Most of the heaters were of conventional design as far as fire box and arrangement of furnace tubes were concerned. Some applications used circular heaters, both vertical and horizontal. With the development of new types of materials of construction, it was possible to develop heaters with considerably greater BTU release per cu. ft. of furnace volume which should find further applications in the refining industry. One interesting development was the application of portable fired heaters for a service requiring over 60 million BTU's per hour which now justifies the application of portable heaters with unlimited BTU requirements. This application is of value where a fired heater on an existing operation requires replacement with minimum production downtime. In one case the loss of time switching from the old heaters to the new fired heater moved into place was only nine days. The time for moving the heater from the temporary site where it was erected to the permanent location was in the order of ten to fifteen minutes.

Pressure Vessels:

The ever increasing demand on the refiner to handle crudes of higher sulfur content is reflected in the need for protection against rapid metal corrosion in pressure vessels. The refiner may choose from (1) some type of alloy protection, (2) reinforced ganister lining, or (3) provide substantial corrosion allowance in the form of added wall thickness of vessel, predetermined from an anticipated rate of metal loss.

With the lifting of government restrictions on chrome and nickel alloy steels, the trend is to use corrosion resistant, alloy lined vessels more extensively. Current economic studies favor alloy protection if substantial metal must otherwise be added to the wall thickness as corrosion allowance for a reasonable vessel life expectancy. This is readily confirmed when consideration is given to the fact that fabrication labor is the largest cost factor in producing pressure vessels, and is approximately proportional to the wall thickness.

Reinforced ganister linings generally have a limited use due to temperature limitations and mechanical complications encountered in applying to a vessel equipped with bubble trays or fractionating internals. The life of such type linings is somewhat indefinite, and failures occur because of spalling and erosion.

For alloy protection the refiner has available either the homogeneously clad alloy plate or the so-called "continuously welded" light gauge stainless steel lining. Both types lend themselves to Class I vessel construction and provide full protection throughout. Manway necks and nozzles of similar size may be fabricated from lined plate while smaller nozzles are usually protected by a sleeve liner. Where refiners are required to run higher sulfur crudes than their vessels were designed for, it is practical to strip weld or plug weld alloy lining in the field. Alloy lined vessels are becoming more and more the choice of refinery engineers who have an eye to minimum future vessel maintenance.

The refiner has a similar decision to make in the selection of bubble tray and other fractionating tower internal materials. Generally the choice must be made from cast iron, fabricated carbon steel or light gauge high alloy steel. If cast iron or carbon steel are selected, ample corrosion allowances must be provided for a reasonable life expectancy. Current cost analyses

[1] The Lummus Company

favor light gauge stainless steel material. Present day pound costs of light gauge stainless steel bubble trays are approximately three times greater than cast iron, but this differential is more than offset by the weight savings in favor of stainless steel.

A comparison of weights and unit costs for a typical bubble tray installation is about as indicated.

Typical 8 Ft. Dia. Bubble Tray Assembly

Tray Material	Nominal Thickness Inches	Weight Per Tray Pounds	Fabricated Cost per Lb. Cents	Approx. Cost Per Tray
Cast Iron	3/8	3800	20	$760*
Fabricated Carbon Steel	5/8	3500	28	980
Stainless Steel	1/8	1100	60	660

*Pattern Cost Included

The installed cost differential between stainless steel and either cast iron or carbon steel is slightly larger than indicated by the above table, because of lower installing labor costs in favor of the light weight stainless tray.

Pumps, Blowers, Compressors and Drivers

Ten years ago vertically split pumps and 3550 RPM pumps for refineries were still new enough to be looked upon with disfavor by many as being too radical and too hard to maintain. It was common practice to apply reciprocating pumps in services for which centrifugals were well proven.

Five years ago refinery engineers were willing to buy an overhung-impeller "process" pump or a mechanical seal or a vertical multi-stage pump, all of which were new then, until assured of a good service record in some other refinery.

Today refinery process type pumps are no longer a novelty, although the special features built into them to make them suitable for handling erosive slurries or for handling the most feared of all acids made news only "yesterday". Mechanical seals are still in the limelight, however. Durametallic, Ingersoll-Rand and John Crane are well recognized for their contributions to the art of taming the packing box with seals. Other developments of interest are currently in progress in this country and abroad. Single seals are now being used to hold propane and equally light hydrocarbons at pressures ranging from 350 to 500 p.s.i. in at least five refineries.

Among the newest pump arrangements is one being used for the gathering pumps in isolated parts of tank farms, arranged for remote starting and stopping without attention. These pumps are vertical, single or multi-stage units, built close-coupled on a special vertical motor, the whole motor being filled with an oil and held at pump discharge pressure by a hydrostatic connection (the two liquids kept separated by a seal-pot or diaphragm) and having a mechanical seal on the motor shaft to prevent the motor oil from escaping into the pump. With this construction the mechanical seal never has to withstand a high differential pressure. If an excessive loss of the oil should ever occur at any time or over a long period, an electrical shut-down control automatically prevents damage. These stuffing-boxless pumps are expensive as compared to regular motor driven refinery pumps, but they pay off in that they can be left unattended for long periods of time.

Reciprocating compressors, speaking of angle units driven either by gas-engine cylinders or steam cylinders, cannot be speeded up too much. Therefore in the manufacturers' endeavors to increase the rating of a single compressor unit, just as with reciprocating airplane-engines, developments to date have consisted of providing more power-cylinders, or larger cylinders, or higher-m.e.p. cylinders. Free-piston type compressors may be a "new" development, perhaps just around the corner, but they would appear to have handicaps such as wearing parts, pulsation, and occupying too much floor space. To get away from these disadvantages of reciprocating machines, the natural trend is toward centrifugal blowers and centrifugal compressors, which are not really new except for their uses in refineries. The general designs of most all these machines are generally well known. Their use has established reliable performance in numerous services.

There is more widespread use of high back-pressure steam turbines in the larger sizes. To date it has not been found possible to supply vertical steam turbines above 100 h.p. at reasonable prices. Gas turbines are new and more applications will be established for them, probably in locations where treated water is not at hand.

If pumps and blowers are to continue the trend toward smaller units for higher ratings, which is natural and desirable, operating speeds will sooner or later be raised again. Further increases in speed should bring about additional economies. For example, by doubling the customary pump speed of 3500 RPM, the head is quadrupled without changing impeller diameter. Thus 7000 RPM pumps with one impeller are now available which will replace four-stage 3500 RPM pumps with equal overall efficiency, turbine driven. Multi-stage 7000 RPM pumps are now being designed by several manufacturers, and a few are actually available now.

Paradoxically, for particular applications 7000 RPM multi-stage axial-flow blowers can be purchased in smaller sizes and at less cost than the customary single-stage 3500 RPM centrifugal blowers, for the same duty. Impellers are of a different type.

At the present time drivers for high speed centrifugal pumps and blowers are limited to turbines. It is possible that manufacturers will soon have available electrical frequency changers which will also make it possible to employ electric motors for driving these units.

Heat Exchangers

Heat exchanger developments during the war years have been largely the application of proper materials of construction and the selection of proper designs for the service required. Some unusual developments or applications to unusual services have been the use of combination condenser and cooler unit in the synthetic rubber industry, condensing hydrocarbon vapors over a long condensing range and cooling the condensate to a temperature close to the temperature of the cooling medium. Another illustration of a new development in heat exchanger design was the application to the cooling of a mixture of hydrocarbon, nitrogen and ammonia gases at 2500 lbs. using gas of the same constituents and pressure as a cooling medium. A recent development for the use of high pressure on the tube side was the design which has been called the Multi-lock. This design has the advantage of eliminating all bolts for holding the heads against the pressure. The pressure load is transferred to the channel through split key rings, working in shear, recessed into the channel. Two rings bolted to the channel and cover require relatively few small studs to seat the single gasket for sealing the unit.

These developments are only typical of many produced during the recent years to meet new and unusual operating requirements requiring immediate solution.

Instruments

The selection of instruments in oil refineries is resolving itself into the use of a minimum number of different types of standard instruments or so-called "off the shelf instruments". An example of this can be shown by the instrumentation of a Thermofor Catalytic Cracking Unit which employs only one especially designed instrument and one especially designed control valve. The instrument is used to determine the level of a solid bed of catalyst. The valve is a vane of knife edge plate valve used to control the flow of catalyst. The balance of the instruments are manufacturers' standard equipment.

This practice of simplification has proved its worth in expediting and greatly reducing engineering, construction and manufacturing costs, by facilitating initial operation and education of plant operating personnel by reducing maintenance care and costs and by permitting last minute changes in plant operation or instrumentation without delay.

The use of a minimum number of different types and weights of control valve bodies or relief valves, as typified in Limitation Order L-272 and National Bureau of Standards Simplified Practice Recommendation R205-44 provides flexibility and interchangeability to greatly decrease costs especially where considerable revamping of equipment for new process operations is required. The use of pneumatic transmission for instruments has resulted in simplification and the reduction of costs. In fact, it is sometimes surprising the extent to which simplified practices are employed, even temperature wells where one or two types of wells in three or four standard lengths can meet almost all requirements in the construction of a plant.

Control rooms are, in general, being improved as to appearance, convenience and elimination of hazardous conditions. They are being constructed as a separate unit, or as a part of a building containing non-hazardous equipment. Since many control rooms have in the past used forced ventilation, some are now adding air conditioning. Many control rooms are being effectively sound-proofed to reduce noise volume from mechanical equipment by simply applying acoustical finish plaster over the regular plaster bases. The additional cost of the acoustical plaster over regular finish plaster is material cost only since application labor is the same. The noise reduction coefficient of ½" acoustical finish plaster is approximately 0.6, which is equivalent to the application of ¾" thick acoustile units. Acoustical plaster is fireproof and many units are not. Consideration is also being given to proper illumination of the instrument control boards. Since many control rooms sometimes contain from 100 to 200 feet of panel board and the use of black colored panels absorb much of the light, most control rooms and panels are being finished in light colors. The instrument panels are being illuminated by the use of a row of vapor-proof lighting fixtures located above and directly in front of the instrument panels in such a way as to illuminate the instrument board without objectionable specular reflection in the instrument windows from the position of the operator.

The general use of electronic instruments in refineries has been kept to a minimum probably because of the explosive hazard present, with the use of this type. Many types of highly specialized electronic computers, calculators and controls were developed during the war. It now appears that much of this equipment will be redesigned for commercial use. It will probably make its first appearance in boiler houses since many boiler houses now use electric controls and electric motor drives in their control systems. The equipment that will be used will probably follow the patterns of equipment used in electronic data computers for anti-aircraft and coast artillery defense and as used in aircraft firing controls. They will probably consist of servo-mechanisms using potentiometer controllers or to particular curves or equations as are now being used in the Dehmel Trainer, which is in production by Curtiss-Wright Corporation. This type of servo mechanism is readily adaptable for use with present two phase motors that operate dampers, control valves, etc. in boiler houses. The equipment can be arranged to give continuous calculation of the process as well as control it, and to give a total calculation for daily yields. Since the refineries have generally used the most modern types of instruments and controls, it is to be expected that electronic controlled servo-mechanisms will be adopted by them to supplant or supplement present instruments.

PRINT IN BINDING

Burner for Gas-Fired Furnaces

THE COPPUS ENGINEERING CORPORATION have produced a new gas or gas-oil combination burner incorporating the Dennis principle of combustion (mixing characteristics) of utilizing revolving orifices in conjunction with a fan operating at high speed and driven by the reaction of the fuel, discharging transversely to the air stream and in the correct proportions to the air at all times. The illustration shows the appearance of the burner with fan.

The burner is constructed so that the gas passes through a hollow shaft into the drive hub and from there into the driver arms, discharging through orifices contained in the driver arms. The power developed by reaction of the fuel discharging from the orifices of the driver arm is determined by the number and size of the orifices and by the fuel pressure.

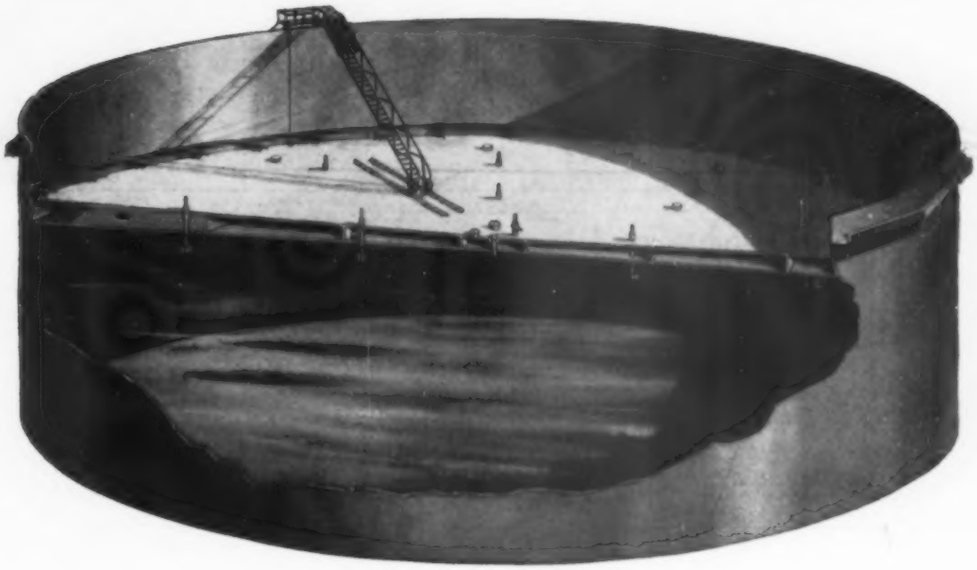
The fan, which is bolted to the driver hub, is so designed that its power requirement coincides with the power developed by the driver and that it delivers slightly more air than is necessary for combustion of the fuel discharged through the orifices.

If the fuel pressure is increased, the rotating speed of the fan and the gas discharge is increased and the fan again delivers at the higher speed the right amount of air for combustion of the increased flow of fuel.

The correct air-fuel ratio will be, therefore, maintained whether the burner is supplied with fuel at, for instance, a maximum of 4 pounds or 40 pounds pressure. It always will have a turn-down ratio from its full pressure to minimum. It is not unusual in field operation to find the combustion gases as low as 0.2 to 0.4% oxygen and no carbon monoxide. The carbon dioxide of a natural gas having a theoretical end products analysis of 11.7% will average above 11% CO_2 with no traces of carbon monoxide.

This practically perfect combustion is readily explained by the fact that the violent mechanical mixing and agitation of the gas and air bring the oxygen molecules together with the hydrocarbon molecules so that the latter absorb the necessary oxygen for complete combustion, wherein the aldehyde burns completely to CO_2. This combustion cannot be secured by any other means except by mechanical mixing because unless the mixture is complete the aldehyde breaks down into CO and H_2 before combustion is complete which is the reason ordinary burners require excess air to assure that the secondary combustion in the furnace takes place in a medium of sufficient oxygen.

These burners require less draft than any other burner and in many cases eliminate the necessity of forced draft equipment. Mixing and proportioning of fuel and air take place at the entrance to the furnace obviating the necessity of high throat velocities required by outside premixing burners.

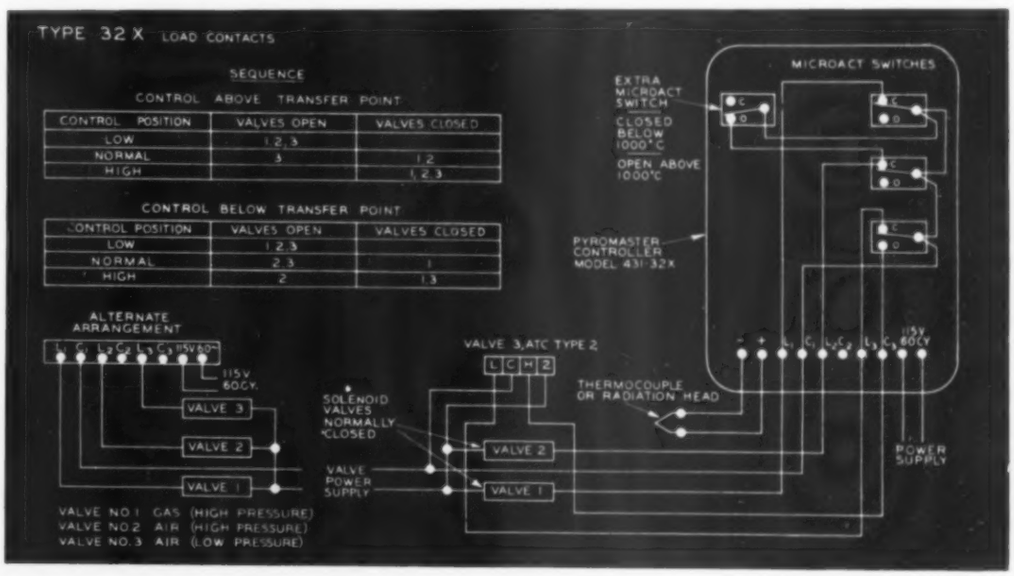


Horton Floating Roof

AN improved Horton floating roof, of double-deck construction has been developed by the Chicago Bridge & Iron Company. It is used on flat-bottom tanks storing volatile liquids.

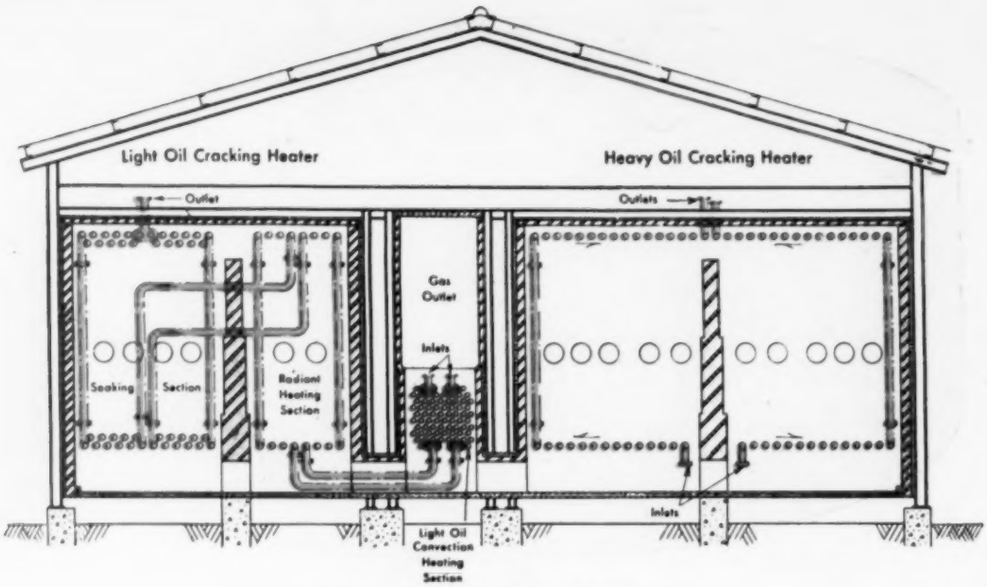
The double-deck construction (see illustration) insulates the liquid and eliminates practically all boiling, thus extending the range of products previously stored in floating roof tanks. The bottom of the deck is sloped up toward the center and the roof is designed to vent all air from beneath the deck. The top of the deck is smooth and slopes toward the drain located at the center.

The Horton seal closes the space between the tank shell and the deck. A sealing ring forms a long sliding contact with the tank shell and is joined to the deck by a continuous gastight curtain.



Two-Stage Heating Controller

THE BRISTOL COMPANY has adapted a standard model of the recently announced Pyromaster Microact Controllers to the special requirement of two stage firing of gas furnaces. In the drawing is shown a schematic diagram of the installation for one type of controller. A Model 431-30 with an extra switch is used and the temperature at which the transfer from low temperature firing to high temperature firing is set by adjusting the extra switch. Complete details are given in Bulletin PB1228.



Thermal Cracking Heaters

A MOST important feature in thermal cracking is a multiplicity of burners located centrally between roof tubes and screen tubes to provide accurate oil-temperature control. This feature is one of a number in this latest Foster Wheeler oil heater design, called the "Downdraft."

Reduction in initial cost per unit of heat input, more uniform distribution of radiant heat and accurate oil-temperature control are outstanding advantages which reflect the engineering correctness of the basic principles of the design of this new oil heater. These results were achieved by:

1. Combining both cells in a common setting. This makes it possible to: (a) use longer effective tube lengths thereby reducing the number of expensive return bends; (b) eliminate a separate convection bank for the heavy oil coil resulting in more economical surface, higher efficiency and substantially lower pumping cost.

2. Providing a multiplicity of burners in approximately center position, vertically between the roof tubes and the screen tubes in both the heavy oil and light oil heating cells. The almost ideal furnace condition resulting from this combination, particularly the even distribution of radiant heat, makes possible: (a) independent control of two or more heavy oil streams, thereby minimizing the possibility of excessive temperatures and coke formation; (b) separate and effective temperature control of both heating and soaking in the light oil coil which also may be divided into two or more streams depending upon the capacity of the unit.

ProtectoSpray for Fire Fighting

THE "PROTECTO SPRAY" (Grinnell Company) is a fixed system of medium velocity spray for protecting tanks, structures, and equipment by cooling. These sprays (see illustration) are made with deflectors giving various angles and patterns of discharge. The manufacturers engineer the correct Protecto-Spray projector to meet the requirements of the hazards in each installation.

Grinnell ProtectoSpray installations give control of fires in highly volatile liquids and provide protection through cooling for pressure vessels, piping, equipment and structures in fire hazard areas. This medium-velocity, fine spray protection prevents the heat of the fire from causing serious damage by maintaining a coating film of water on the protected surfaces.

ProtectoSpray equipment is particularly applicable to areas which may be exposed to fires in vapors from flammable liquids. Where the cooling spray can be applied to the whole of a fire zone, extinguishment may occur, but the primary function is cooling.

ProtectoSpray installations are of the dry type eliminating the dangers of freezing. Water is released into them by automatic control. Automatic control may be for either fixed temperature or rate-of-rise operation, using controls thoroughly tested and proven in many years of use in other types of Grinnell Fire Protection equipment.

ProtectoSpray installations give a maximum degree of protection with a minimum quantity of water by applying it in its most effective form. Where water supply and reserves are limited this feature often makes protection possible in locations where hazards might otherwise have to go uncontrolled.

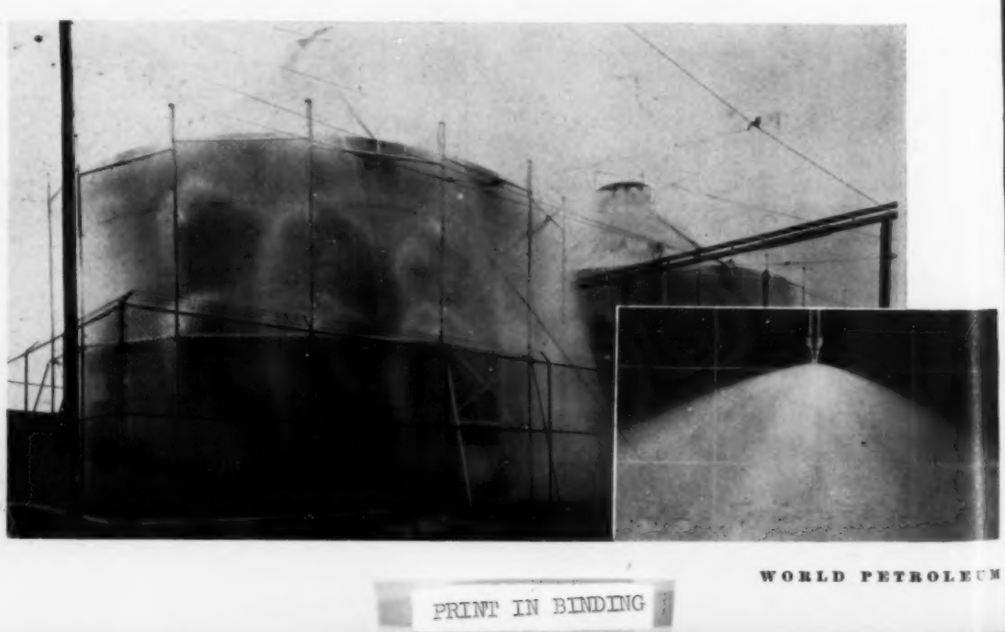
Furnace Observation Doors

SPEAKING of industrial furnaces, including oil stills, the Bigelow-Liptak Corporation observes that the reason the observation doors have not been given the attention they deserve because by their very nature they seem to be a minor piece of equipment, and the designers have always been busy with what seem more important devices.

Furthermore, many doors which seemed on the drawing board to have good ideas and good features have not stood up in operation, resulting in many broken, clouded and blocked out doors.

The furnace observation door designed by Bigelow-Liptak engineers consists of a heavy frame arranged for mounting directly against an exterior furnace wall of any type. The main casting frames a rectangular observation port 4½" high by 6½" wide which has a hinged shutter normally closed to prevent air infiltration or "puffs". The shutter or inner door is attached to a shaft rotating within the main frame and operated externally by a lever and pull chain.

An outer covering or lens frame is also hinged by a shaft, bearing in the main frame. This lens consists of a cast iron frame with 7/32 in. heat-resisting blue glass corresponding in size with the observation



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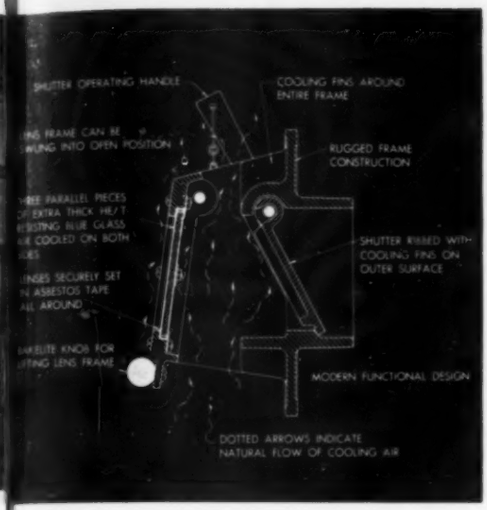

SHUTTER OPERATING HANDLE
COOLING FINS AROUND ENTIRE FRAME
RUGGED FRAME CONSTRUCTION
SHUTTER RIBBED WITH COOLING FINS ON OUTER SURFACE
MODERN FUNCTIONAL DESIGN
DOTTED ARROWS INDICATE NATURAL FLOW OF COOLING AIR

port in the main body casting. Normal function of this is to observe the action within the furnace without eye strain or other damage.

This outer cover is removed some distance from the inner cover or shutter to permit a film of cooling air to pass between the two, thereby minimizing the risk of damage to the glass from radiant heat of the furnace.

A plastic ball of low heat conductivity attached to the lens frame permits lifting the latter and when in its top position, it will remain full open. In the event full and continued opening of the observation door is desired for use as a poke hole, it is then necessary only to lock the shutter in open position by means of its pull chain.

The photo and drawing herewith reproduced are self-explanatory.

Marley Cooling Tower

A NEW Double Flow type cooling tower has recently been developed by The Marley Company for heavy industrial uses.

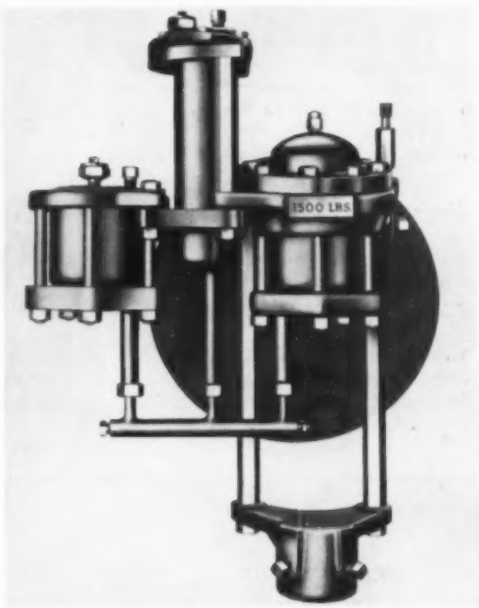
This cooling tower design is unique in a number of different ways. Instead of the conventional counter-flow principle of air and water in this tower, the air flows horizontally inward from both ends at right angles to the water which is flowing downward through the filling. The wide V-shaped eliminator arrangement permits the use of approximately 30% more eliminator area and provides a large plenum chamber which prevents the short circuiting of large percentages of the filling. Eliminator sections are always accessible for immediate inspection, even during operation as may be noted from the location of walkways and access doors.

Another outstanding feature is the open type distribution system for each half of each cell. This rarangement permits inspection of and access to the distribution system at all times without shutting down that section of the tower. It also provides great operating exibility as the flow to either side of the cell may be reduced or completely shut off as desired. Piping inlets are provided either at the sides or ends of the tower, at the option of the purchaser, thereby often effecting great savings in the inlet hot water to the tower. Marley stainless steel-clad airfoil section fan blades are driven through a special gear reducer designed for induced draft cooling towers. This is done by means of flex disc drive shafts which require no lubrication. With these motors are located outside of the humid air stream on a platform where they may be inspected during operation.

New Meter Provides Double Rangeability

AN important development in wide-range metering is marked by the introduction of the Foxboro Duo-Range Meter, a product of The Foxboro Company. In any application where there is wide variation in flow rate, or where the change in range is greater than 3½ or 4 to 1, the Duo-Range Meter offers conspicuous advantages, doubling the rangeability to 7 or 8 to 1, and thus doing away with the necessity of changing range tubes or orifice plates. The savings are obvious; one instrument does the work of two; only one chart is used; space is saved and maintenance time reduced; and the handling and commputation of charts is simplified.

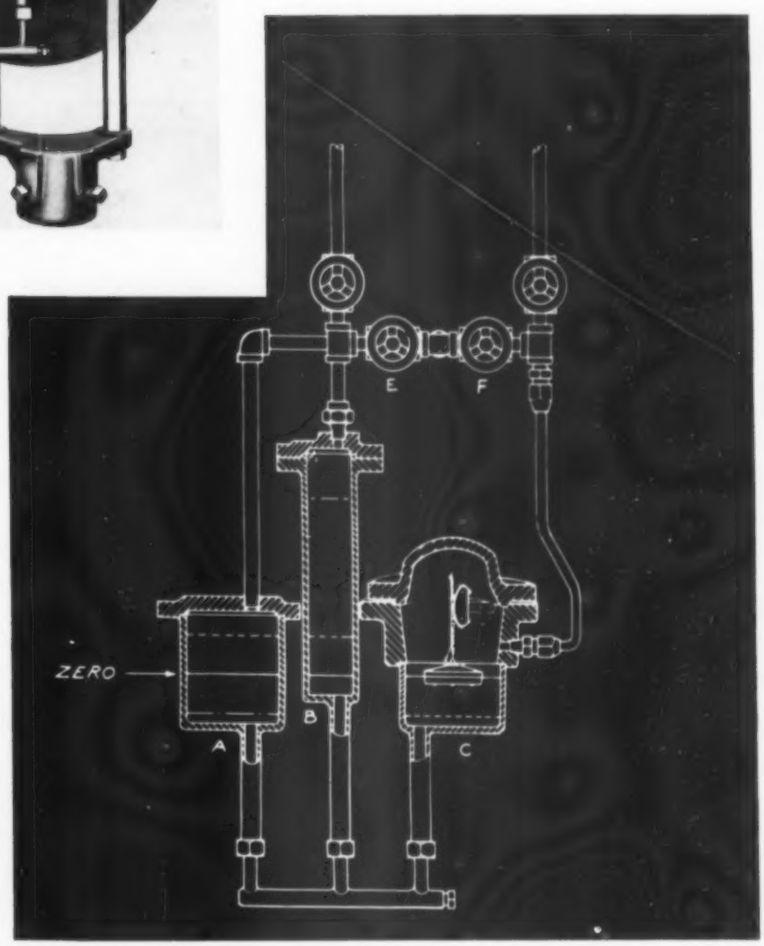
The Duo-Range Meter is a differential-type instrument employing the mercury-float principle and following standard Foxboro Meter design. Its important difference from Foxboro Meters which have been familiar in the petroleum industry for over a quarter-century is in the addition of a supplementary chamber which, by the opening and closing of two manifold valves, changes the meter range from 0-25″ to 0-100″. The change is immediate. The calibration of the meter is not disturbed. It is not necessary to re-zero the instrument or to make any adjustments whatever.

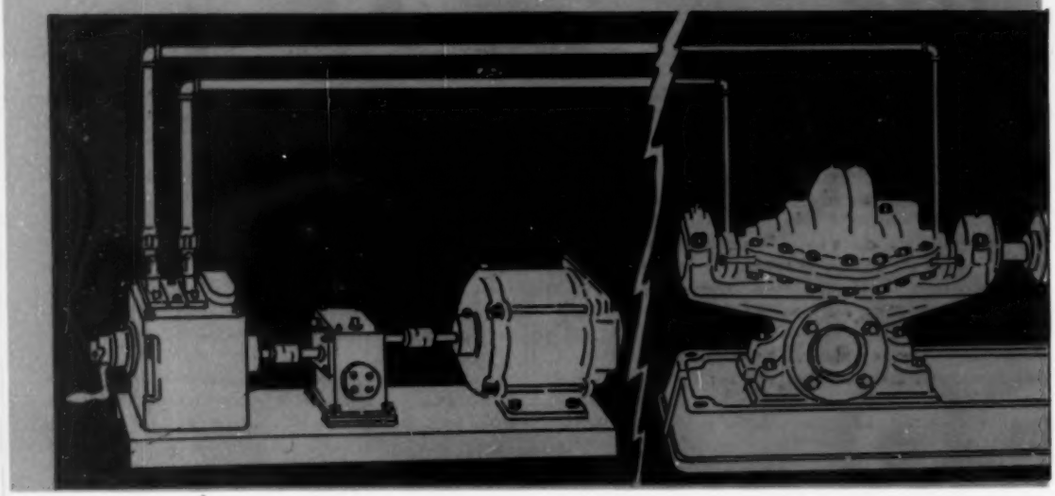


The accompanying photograph shows the rear view of the Duo-Range Meter. The simplicity of its operation is explained with the aid of the corresponding sketch. The piping connections, from the orifice plate to the meter are indicated at the top, with a four-valve instead of the customary three-valve manifold. Valves E and F are the ones by which the instrument is instantly switched from one range to the other. The float mechanism is in chamber C, which is always connected to the upstream side of the orifice.

Chamber B is always connected to the downstream side. Chamber A is switched from the upstream to the downstream side, depending on which range is desired. When chamber A is connected to the downstream side, that is, with valve E open and F closed, the range is 0-25″. When valves E and F are switched, E closed and F opened, chamber A is connected to the upstream side and the range is 0-100″.

Meter service is not interrupted; the change is completed within the few seconds required to turn the two valves; the recording pen, which previously had been in a position near the outer rim of the chart, now drops to a middle-chart position and continues its recording.





Mechanical Seals for High Pressure Pumps

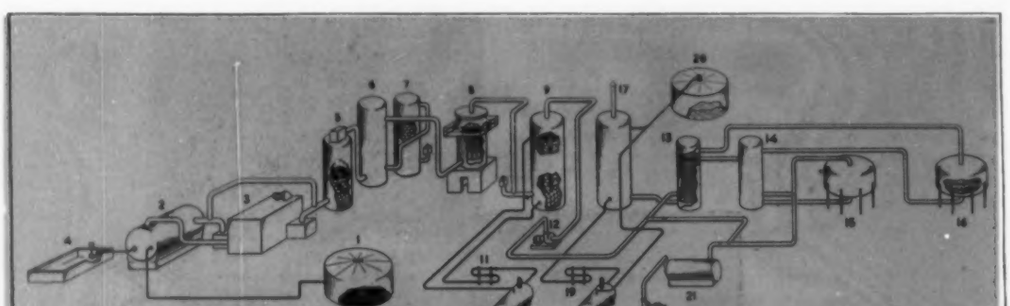
HERETOFORE it has been a generally accepted practice, for satisfactory sealing of pumps and pressure vessels handling light hydro-carbons at pressures over 125 lbs., to use a double mechanical seal arrangement in the stuffing boxes which requires an auxiliary oil circulating unit. There has been some objection to this method, due to the auxiliary equipment and increased maintenance.

Successful sealing of light hydrocarbons, such as propane and butane, has recently been accomplished by the use of a single lubricated Dura Seal (rotary mechanical seal), employing a mechanical, motor-driven lubricator of the Hills-McCanna or Manzel type, for pressures over 125 lbs.

One mechanical lubricator made by the Durametallic Corporation, can be used to supply oil to the faces of Dura Seals on a number of pumps (as many as twenty). Not only does the oil help to balance off the stuffing box pressure, but the lubricating value is highly important to efficient seal operation. Seals will last two and three times longer by this method of supplying lubrication where it is most needed.

Single Dura Seals operating with a mechanical lubricator can be used on fluids such as propane at pressures up to approximately 400 PSI. With fluids having lower vapor pressures, this pressure range can be increased even greater.

To insure proper operation, the lubricator motor can be wired to the process pump motor; thus the lubricator will always start when the process pump is put into operation.



Regeneration of Alkylation Acid

THE Chemical Construction Corporation's alkylation acid regeneration process is based on the fact that when sulphuric acid is decomposed at high temperatures it will break down into its components, sulphur dioxide, water and oxygen. In the Chemico Regeneration Process a specially designed burner sprays the spent acid into a furnace which is maintained at high temperature by the combustion heat of the hydrocarbon compounds in the spent acid and by heat derived from the burning of additional fuel. Sulphur or hydrogen sulphide, if available, can be burned in the same furnace to provide heat and incidentally form additional sulphur dioxide gas for the production of make-up sulphuric acid.

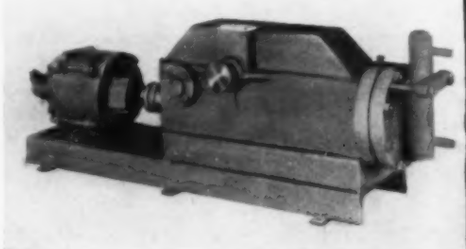
To save fuel and maintain a high strength of SO_2 gas, the air used for combustion is preheated by heat exchange with the hot combustion gases. The hydrocarbons are completely consumed and the gas, after being properly cooled and cleared of a slight carry-over of sulphuric acid mist, is processed to clean acid of 98% or any other desired strength in a standard Chemico Contact Sulphuric Acid Plant. The process is almost as simple to operate as a sulphuric burning contact plant. There are no objectionable fumes and no by-products to dispose of and the product acid is clean and ready for use in the refinery.

The need for supplying fuel to maintain the high temperature in the furnace may be eliminated by blending light refinery sludges to a maximum of 20% with the spent alkylation acid entering the furnace.

The Chemico Alkylation Acid Regeneration Plant may be converted to a plant suitable for processing other refinery acid sludges by the addition of sludge and coke handling equipment.

The various steps in the process are indicated in the accompanying flow sheet:

1. Alkylation spent acid storage.
2. Furnace where the acid is decomposed.
3. Gas-furnace air heat exchanger.
4. Sulphur melter for additional or supplemental sulphur if desired.
5. Gas scrubbing tower.
6. Gas cooling tower.
7. Stripping tower to separate water from the SO_2.
8. Cottrell electric mist precipitator to separate mist particles of H_2SO_4.
9. Drying tower through which circulates 93% sulphuric acid.
10. A pump tank.
11. Cooling coil for the absorbing acid.
12. Centrifugal blower, through which passes the SO_2 after mixing with air in the drying tower.
13. and 14. Primary and secondary heat exchangers.
15. Primary converter for oxidizing SO_2 to SO_3.
16. Secondary converter for any residual unoxidized SO_2.
17. Tower in which the SO_3 in the gas stream is absorbed in 98% H_2SO_4.
18. Strong acid pump tank
19. Cooler for the 98% acid.
20. Tank into which clean white acid is continuously bled from the circulating stream.
21. Starting-up furnace.



Chemical Proportioning Pumps

FOR the precision continuous blending of fluids against pressures up to 5000 psi. the Lapp Insulator Company are offering their new "Pulsafeeder" which is a horizontal direct motordrive, positive displacement, reciprocating diaphragm type of chemical proportioning pump. It consists basically of three mechanical assemblies: reagent head, transmission and electric motor. There may be two reagent heads for feeding two chemicals simultaneously. No working part except the diaphragm is in contact with the liquids. Nothing can leak or corrode, or contaminate the product.

Generally, the Pulsafeeder can be used successfully on any chemical feeding problem which requires precision, continuous feeding or blending of chemicals such as: concentrated and dilute acids, volatile, liquids, slurries and high and low viscosity liquids. The exclusive hydraulically-balanced diaphragm feature makes it possible, for the first time, to pump many highly corrosive and volatile chemicals, which standard commercial feeders of the positive displacement pump type, equipped with packing glands and/or mechanical oscillated diaphragms, have been unable to handle.

For the oil industry its use includes proportioning anti-knock compounds to gasoline, chemical treatment of water including boiler water, maintaining ph. controlled pumping and metering of liquid catalysts.

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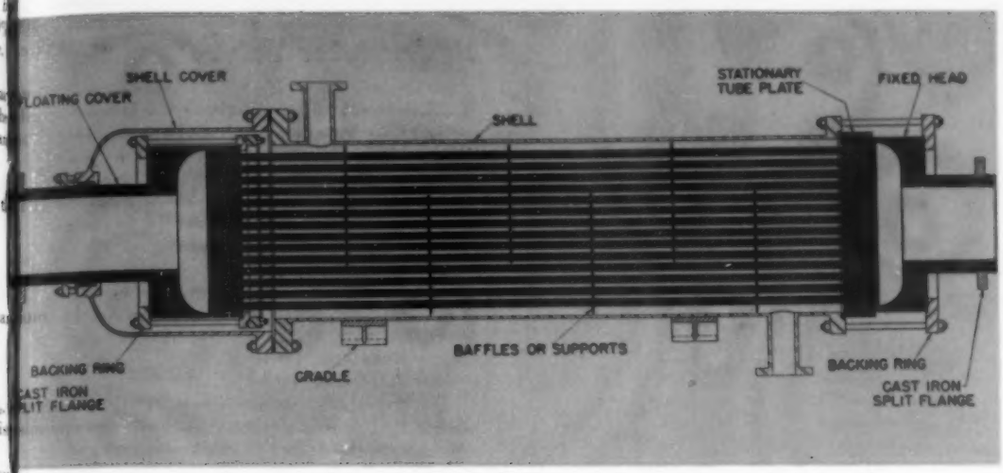


Karbate Heat Exchangers

KARBATE is a graphitic product of the National Carbon Company. It is made by bonding graphite with a synthetic resin into a non-porous solid. It resists corrosion of most corrosive liquids and gases, including Hydrofluoric, Nitric and Sulfuric acids—Bromine, Chlorine and Hydrogen Sulfide gases. It has a heat conductivity three times that of steel and 100 times that of chemical stoneware. It is unaffected by thermal shock up to its working temperature, which is 340° F., and is easily machined and fabricated.

The original cost of Karbate is about equal to stainless steel and similar alloys; however, the superior corrosion-resistance properties of Karbate insures a much longer life and substantially lowers cost per unit of service. This unusual combination of corrosion resistance and high heat conductivity establishes Karbate as an ideal material for use in heat exchangers handling corrosive reagents.

The accompanying diagram shows a single-pass exchanger with full floating head and completely protected with Karbate, this design is in active service in two operations: (1) precooling a mixed gas, consisting of chlorine, carbon dioxide, air, water vapor, and hydrogen chloride, and (2) in vertical position, condensing a mixture of hydrogen sulphide and steam under a 28-inch vacuum.

Other functions which typical Karbate installations have been performing include condensers for nitrobenzene vapor at 221° F. under a vacuum and cooling the condensate to 104° F., and for condensing hydrogen sulfide and steam under a 28-inch vacuum between temperatures of 140° F. and 186° F.

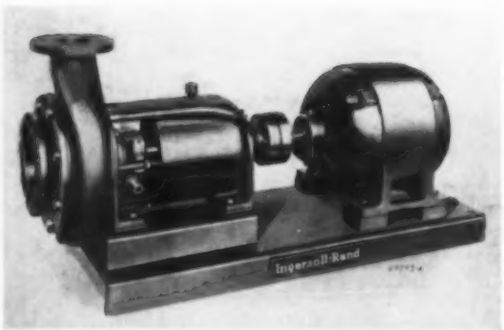
As coolers for 55 percent sulfuric acid from 62° F. to 95° F. and 80 percent sulfuric acid from 60° F. to 95° F.

As precoolers for mixed gas consisting of chlorine, carbon dioxide, air, water vapor and hydrogen chloride from 85° F. to 55° F.

As heaters for 16 percent sulfuric acid with three percent of copper sulfate electrolyte solution from 125° F. to 145° F.

Some of these units have been in operation for more than three years. Karbate is also known to be resistant to hydrofluoric acid, alkalies, and other corrosive substances and their mixtures.

For assembling these exchangers the Foster Wheeler Corporation supplies the basic design and the steel parts and the National Carbon Company furnishes the parts that require Karbate.



Chemical Pumps

INGERSOLL-RAND COMPANY is building a new chemical pumps for applications where all parts coming into contact with liquid are made of a high nickel—chromium—molybdenum alloy steel.

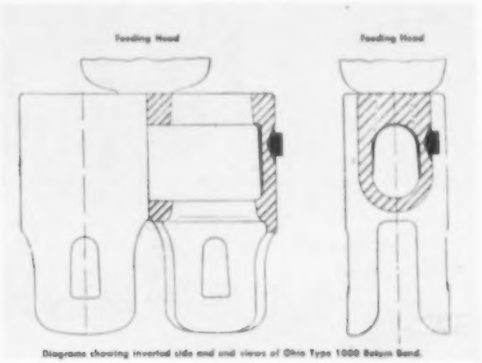
The stuffing boxes on these chemical pumps have been given special attention. They may be packed with whatever type of packing is most suitable for the liquid being handled. A seal cage may be used for circulation of external sealing liquid. All sizes are equipped with the patented I-R "Leakollector" gland which collects all stuffing-box leakage and allows it to be piped to a convenient point. These pumps may also be equipped with the Cameron Shaft-Seal instead of conventional stuffing-box packing.

Directionally Solidified Return Bends

THE Ohio Steel Foundry Company claims to be the first to apply the principle of "directional solidification" to the manufacture of return bends for tubular heating and cooling elements.

"Directional Solidification" means designing parts so that metal sections taper uniformly from top to bottom. Feeding heads can then be located at the heavy end. It's a fact that molten steel completely solidifies sooner in light sections than in heavy. As solidification progresses from the lightest section upward, the heavier portion of the tapered section constantly provides liquid metal to fill the centerline cavities caused by shrinkage or contraction. The casting feeds itself. A sounder casting results—free from the centerline shrinkage or weakness found in uniform metal sections.

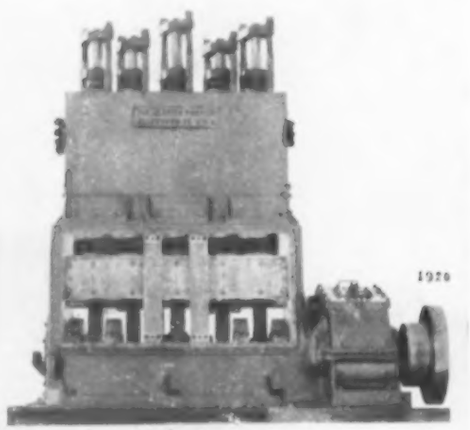
Retaining all of the time-tested features of earlier fittings of this type, the Ohio Type 1000 Return Bend is now designed to take fullest advantage of the principle of 'Directional Solidification"



Diagrams showing inverted side and end views of Ohio Type 1000 Return Bend.

Notice the tapered side walls and center section illustrated by the above inverted diagrams. From the heaviest section at the tube end down to the lightest section at the tip of the mule ear, solidification is controlled directionally, despite the fact that the plug seats are heavier than the side walls.

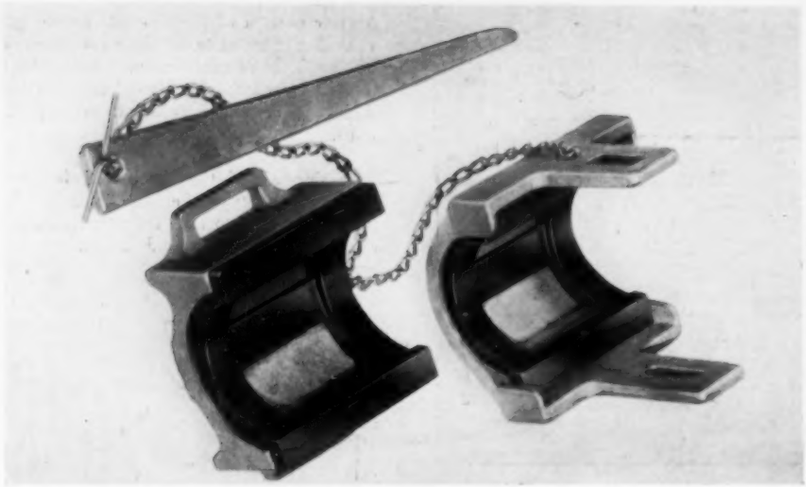
Thus the Ohio Type 1000 is made better than ever. Today's Type 1000 offers the user the following advantages: 1. Stronger ears and walls—no centerline weakness. 2. Longer life due to increased metal in walls above rolled tube, a point subject to severe wear. 3. Reinorced cross-over—notice added metal. 4. A uniformly sound casting.



New Inverted Quintuplex Pump

RATED at 300 to 450 hp, depending upon its speed, a 6 inch stroke inverted quintuplex pump has been designed in response to a growing demand for the smooth performance of a quintuplex in this size. Plunger diameters range from 2 to 5¼ inches, working pressures from 700 to 5000 psi and capacities from 60 to 850 gallons per minute.

The Aldrich line of inverted quintuplex pumps now includes 6-, 8- and 10-inch pumps requiring from 300 to 1000 hp. The new data sheet Number 67, which describes these pumps in detail and contains a pump selection chart indicating the correct quintuplex pump for various conditions of pressure and capacity, is available.

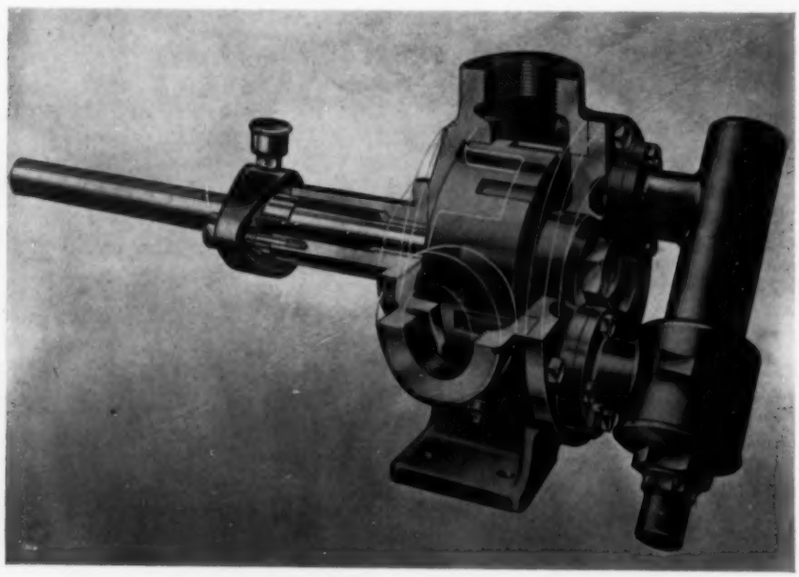


Quick Pipe Couplings

FASTER coupling of pipe is claimed by Drinkwater, Inc., for the new flexible pipe couplings known as Drinkwater Presto-Lock Couplings, which are made in 11 sizes from 1¼" to 16". They can be used with any plain end pipe without threads, grooves or flanges. No wrenches or special tools are required, only a hammer to tighten wedge keys after the two sections are fitted over pipe ends and wedge keys have been inserted in the key channels.

The three simple parts of Presto-Lock Flexible Couplings are the two corrosion-resistant malleable iron castings and the quick-locking wedge key. Sizes 1¼", 1½", 2", 2½" and 3" are equipped with one wedge key and chain assembly to prevent loss of coupling parts. Sizes 3" to 16" have two wedge keys but no chain assembly. The gaskets which are used on all couplings have been specially designed to affect a permanently tight seal on all types of pipe lines. Synthetic rubber, neoprene and natural rubber gaskets are available.

Tests show that the couplings give up to 40 degree flexibility at each joint, acting as a sleeve, elbow and ball union at all times. They can be used for repairing any size leak that the coupling will cover and they withstand all normal working pressures of gas, steam, oil and water. Any plugged or frozen lines can be released immediately by a tap of the wedge key.



Hazardous Liquid Pumps

THE Viking Pump Company announces the enlargement of their line of pumps to include nine sizes up to 300 gallon per minute. The complete range is available in various mounting styles. These include back geared drive, V-belt drive, connected and flat belt drive.

The 5 gallon per minute sizes are now furnished with integral relief valve mounted on top of pump casing and all other sizes are furnished with the relief valve mounted directly on the pump head. All of these units are equipped with an extra long stuffing box for pumping hazardous liquids. Stainless steel shafting is standard on all pumps as well. The 200 and 300 gallon per minute pumps are new sizes.

Hydramotor Valves

THE improved General Controls G-3-1 Series Hydra motor valves are specifically designed for heavy duty All valve bodies are high-strength iron (steel on order) bronze trim, with recessed bonnet gasket and stainless stems. For air, oil, water, gas, brine or butane. Two wire, current failure. Operator sealed in oil, requires no maintenance. Standard packing glands have temperature rating of 450°F. Maximum operating pressure up to 400 lbs. per square inch.

Simplification of many valve control installations is now possible with the development of the two-wire current failure, electric-hydraulic operator. Motor driven, the unit has ample power; moves slowly on opening and closing. Operator drives in one direction against a spring; failure of power or opening of circuit permits spring to return valve to opposite direction. The Hydramotor has no gears in the mechanism; a directly connected, motor-driven pump creates the hydraulic pressure that directly operates valve to desired position. After the hydraulic action has taken

place, the pump operating motor is cut off by the only switch contained in the control. The oil, then under sufficient pressure to hold the valve open, is held by a magnetically actuated release valve as long as current is kept on the valve. Should the current fail at any time, the magnetic release valve opens, relieves the oil and permits the Hydramotor to return to the normal, current failure position.

Hydramotor Valves come in a number of standard combinations to facilitate better control of various liquids and gases. Single-seated valves, usually with composition discs, and bronze trim will fulfill most requirements. For corrosive conditions, iron, aluminum, bronze, stainless, or Monel trim can be furnished. The usual temperature and pressure ranges are covered by three types, F, L and H.

Continuous Viscosimeter

A NEW kind of continuous Viscosimeter is announced by the Fischer & Porter Company. The operational characteristics represent a radical departure from the conventional method of viscosity measurement. The instrument is so constructed as to permit instantaneous observation of viscosity values existing in a moving fluid stream under full line pressure. This viscosimeter is available in simple indicating form, or arranged for continuously recording viscosity values on a 24 hour chart or for controlling fluid viscosity by automatic blending or heating means. The instrument is said to be particularly valuable for continuously blending lube oils, indicating the end points in various plastic processes and in the maintenance of constant fuel oil viscosity for improved oil burner operation.

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Pumps with Removable Liners

N applications where the liquids handled cause excessive wear on the pumps, the new Blackmer pumping units with removable liners are designed to pay for themselves in savings on pump replacements. When liner has worn it is easily replaced. No internal adjustments are necessary, and neither piping nor drive are disturbed.

his type of construction is advantageous in remote locations. It is possible to maintain an inventory of the removable liners and "buckets" for these pumps and thus assure uninterrupted operation without the installation of complete standby equipment.

Adjustable Temperature Control

PAUL HENRY COMPANY announce an adjustable calibrated "Cam-Stat" temperature control for liquid heaters over the temperature range between minus 50 and plus 600° F. with differentials as low as 1 degree Fahrenheit. The "Cam-Stat" may be clamped on the tank or the element may be immersed in water. A wide variety of mounting means is available for adapting the unit to the control of air, gas, liquid or solids.

A long life of trouble free operation is insured by the double break snap action contacts with a rating of 22-amperes, 115-volts A.C. or 28-volts D.C., available in S.P.S.T., S.P.D.T. or S.P.D.T.—Independent Circuit.

New Carbon Electrode Holders

A COMPLETE new line of air cooled carbon electrode holders for manual welding has been announced by TWECO PRODUCTS COMPANY. The line includes four sizes, 150, 200, 300, and 500 ampere models. Positive "Hol-Grip" design with ample length and ventilation are features of this new line.

The average carbon arc welding job is done with either the 13½-ounce 150-ampere holder or the 20-ounce 200-ampere unit. These two units are furnished optionally with or without special "Quick-Attach" whip cables for short duration jobs. The 300- and 500-ampere models are suitable for heavy welding, and cutting jobs.

Combustibles Recorder-Controller

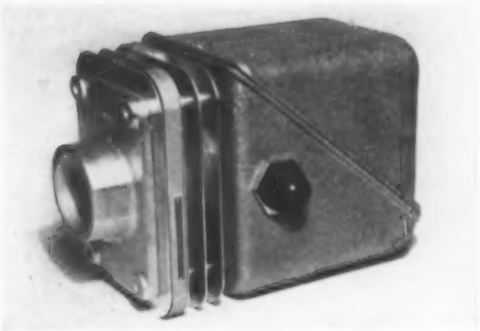
A new automatic analyzer and recorder for indicating, recording and controlling the combustibles content of a gaseous mixture has been developed by the Bailey Meter Company. This instrument has been successfully applied to precision control of furnace atmospheres and chemical processes, as well as combustibles measurements in the petroleum, metallurgical, automotive and chemical industries.

The analyzer and recorder provide a continuous graphic analysis almost instantly, and they are said to be responsive to changes of .05% combustibles. Sustained accuracy is said to be within .25%.

A continuous gas sample is mixed with compressed air and burned on a catalyst-filament which reaches a temperature proportional to the combustibles content. Since the filament resistance is a function of temperature, a simple resistance bridge connected to a null-balance electronic recorder completes the installation. It may be calibrated in per cent combustibles, mixture ratio, or other desired terms.

Pneumatic control or electric alarm contacts may be provided on both one and two-pen recorders. A two-pen recorder utilizes separate analyzers so that the speed is not impaired by switching, and the two records are independent of each other.

Variable fuel quality does not affect the accuracy of control of installations of this type. Plants in the chemical industries, as well as other operating having processes where gases contain combustibles, find the continuous graphic analysis of this recorder to be a valuable addition to their instrumentation.



Flame-Failure Safeguard

"FIREYE" flame-failure safeguard type F18T is designed to provide explosion protection for all industrial and commercial oil and pulverized coal burners. It is photoelectric — and, therefore, actually sees flame. When flame fails, Fireye instantly cuts off fuel and sounds an alarm. Unlike thermal controls, Fireye is actuated not by the effect of flame failure but by the flame itself. Action is positive, instantaneous, electronic.

Fireye Type F18T consists of a phototobe and amplifying system, housed in a dust-tight aluminum case. The entire control is mounted directly on the furnace wall and is aligned in a manner which permits the photoelectric cell to observe the flame through a 2" pipe connection which serves as both a sighting tube and a support for the equipment. A heat-absorbing filter in the lens system as well as an efficient baffle system protects it from all radiated heat. The specially designed phototube permits operation at high ambient temperature.

Other features include a pilot light which can be viewed through an angle of 180°, and a time delay element which prevents the relay from dropping out during purely transient flame disturbances. This apparatus is produced by Combustion Control Corporation.

Cable and Pipe Locator

W. C. DILLON & COMPANY announce a new Stewart cable tester combined with a pipe locator, and known as the Stewart cable tester and locator. The function of the new instrument is to tell just where cable or pipe is buried, and just how deep. It finds the exact path of old cable or pipe laid many years ago on which installation records have been lost or forgotten. It is especially valuable for checking depths at river crossings. The unit is ruggedly built, easy portable, compactly encased for rough use and weather.

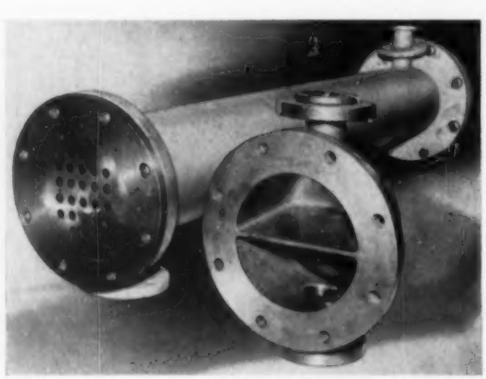
Leak Detector

THE FISHER RESEARCH LABORATORY, having recently developed the M-Scope Pipe Finder, are now bringing out the M-scope oil, Gasoline and Water Leak Detector. As the name indicates, it is designed for use by oil concerns for locating leaks in their pipe and gasoline lines. In principle the instrument depends on differences in the transmitting of sound in the vicinity of leaks. Readings are taken with the 4½ inch visual indicator and headphones. By means of a 10 stage frequency selector control, the best leak response can be determined and interference filtered out.

A calibrated sensitivity control permits taking of accurate readings to definitely spot the location of a leak. The pickup unit consists of a special crystal microphone, a sounding plate, two sounding rods, extension cables, etc.

The equipment is housed in an attractive leatherette carrying case.

According to a statement issued from the Laboratory the effectiveness of the M-Scope equipment is exemplified by reports from two customers. One claims the location of about 317 leaks over a period of two years and another important company claims the reduction of 85% in cost of pipe location jobs by using the M-Scope Pipe Finder.



Multi-Material Equipment

The Pfaudler Company have issued their new manual No. 837 describing a unique line of heat exchangers (see illustration) and condensers of the shell and tube type, which can be had in stainless steel. Many of these units have been used in installations requiring the use of glass lined steel, stainless steel and mild steel materials.

The exchangers and condensers described in this manual are: (FST) fixed tube sheet, non-removable tube bundle; (PFH) packed floating head, removable tube bundle; (IFH) internal floating head, removable tube bundle, and (UB) the "U" tube or hairpin tube, removable tube bundle. Many standard variations of these types can be used as evaporators, coolers, reactors, catalyst chambers, etc. in a wide range of operations including work with gases and oils under high temperatures and pressures.

Internally Plated Pipe

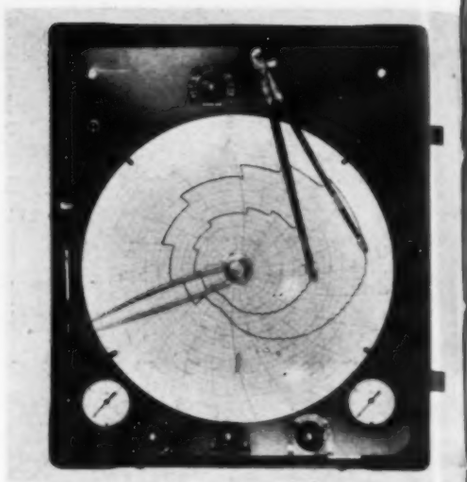
THE inside of steel pipe can be electro-plated with nickel or other metals by means of a new process developed by the Bart Manufacturing Co. The process is relatively inexpensive and is commercially practical. It develops a smooth, ductile, pore-free nickel deposit fully adherent to the base metal, and it can be applied to pipe or tubing up to 18 inches overall diameter, in random lengths approximately 20 feet. Use of the Bart Lectro-Clad Process endows steel pipe with the corrosion resistance of nickel, while retaining the low cost, strength, and fabricating characteristics of the former.

The internally plated pipe can be welded, reduced and bent, hot or cold, without destroying any portion of the internal liinng. In reducing tubing by the cold reduction method, it is now possible to predetermine the actual thickness of the plating throughout the entire reduction, because the applied metal and the base metal are in equal ratio.

Continuous Photo-Copy Equipment

A NEW, 42 inch continuous printer for making photocopies by the hundreds is announced by American Photocopy Equipment Co. The new model CP-421, makes actual size copies of anything written, printed, drawn, typed or photographed—even if on both sides. No darkroom is required—photocopies may be made in ordinary, subdued lighting.

The CP-421 makes photographic tracings from large blue-prints, as the machine will handle photocopy paper up to 42 inches in width, of any length. Operation of the machine is simple, and requires no technical training.



Flow Proportioning

FLOW ratio controlling applications take many forms, the principal one being percentage control of one fluid stream with respect to a variable or uncontrolled fluid stream. Ratio controllers will automatically maintain a fixed percentage ratio regardless of the flow variation of the uncontrolled line.

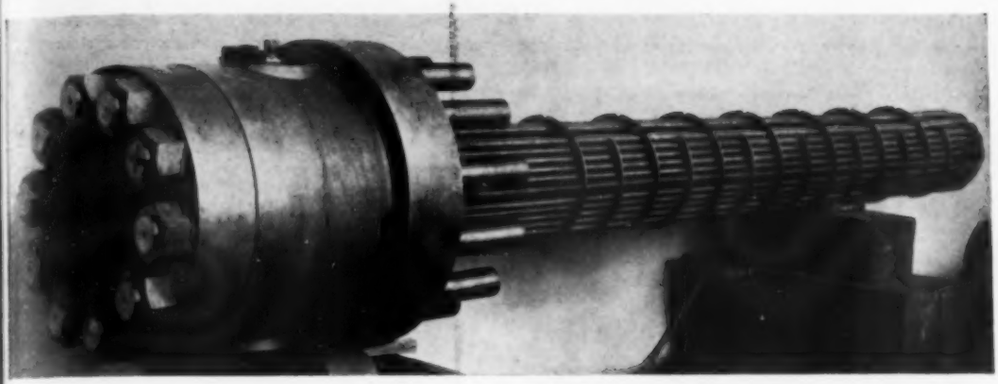
An important example of the ratio control application is found among the gasoline pipe line companies. Here the flow of fuel is free to vary in accordance with pumping conditions. Also, in order to introduce controlled percentage proportions of anti-knock fluids, inhibitors, etc., continuously into the pipe lines, these ratio control instruments are frequently used.

Two remote reading rotameters are used in the Fischer & Porter ratio control system; one meter on each of the two lines to be proportioned. These instruments transmit their flow readings electrically to a remote dual receiving instrument. The receiving coils are enclosed in a single instrument case and a record for both instruments is made on a single chart. A ratio mechanism connects the two pen linkage systems and a pneumatic pilot unit having 150% throttling range adjustment and automatic reset is tied into the system. A diaphragm motor valve located in the secondary or controlled percentage flow line operates from the pilot to control the flow in this line in a conventional manner. The ratio percentage selection is made by a simple adjustment of a ratio knob calibrated from 5:1 to 1:5.

Ball Bearing Swivel Pipe Coupling

THE all-flex ball bearing swivel pipe coupling was specifically designed by Snyder Sales Corporation to solve one of the most critical problems in the transmission of hydraulic power — that of conveying fluids under high pressure through a pipe which swivels or rotates a full 360 degrees.

This combination of multiple synthetic packings and metallic seals offers protection against leakage at high and low pressures. A double row of ball bearings plus metal-backed packings, gives low resistance to rotation, permitting ease of operation at all pressures. This unit is preferably made of steel, and available in sizes ⅛ inch to 1 inch nominal tube size with a variety of threaded and elbow connections to meet particular applications.



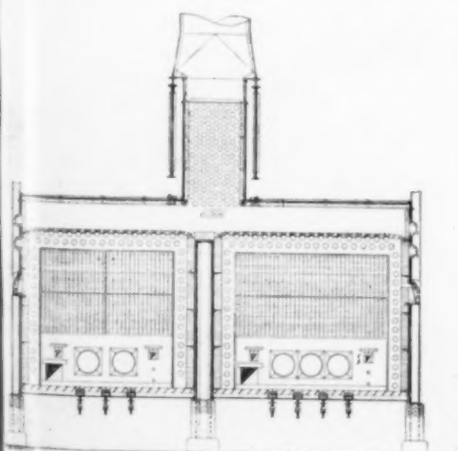
Lummus High Pressure Exchanger

An interesting development in heat exchanger design is a gas to gas unit operating at 2500 lbs. pressure and designed to cool a mixture of hydrogen, nitrogen and ammonia gases using gas of the same constituents and pressure as a cooling medium. This heat exchanger was designed with one piece forged steel shells approximately 1¼" thick and with forged steel channels having integral tube sheets into which ¾" 10 gauge U-tubes were rolled. Problems of design and fabrication of these units are shown in the accompanying photographs and the importance of careful machine work can be appreciated in realizing that the units must operate without possibility of leakage. Tube sheets over 6" thick and channel barrels over 7" thick were used. The unit has operated very successfully.

Portable Fired Heater

The Lummus oil heater has been designed with a stack surmounting the heater structure for use in refineries where existing heaters are to be replaced with minimum loss of production time for the process unit. Recently a 63 million BTU heater weighing 550 tons complete with stack was built about 30 yards from its permanent site then occupied by two other heaters which it replaced. The actual moving of the Lummus portable fired heater from temporary site to permanent location required only approximately fifteen minutes. The loss of operating production of a unit can be reduced to the order of ten days and in one case only nine days were required from off-stream to on-stream for the existing unit.

This accomplishment is made possible by the patented light weight setting construction which shows low heat



loss, low heat storage, and is air-tight because of the standard steel encased arch and wall panels. The other feature required is the above grade hearth design in which the hearth is carried entirely on the structural frame of the heater. Thus during movement of the heater the roller supports can be located directly under the main columns of the heater leaving the hearth free and clear. The accompanying illustration shows the cross-section of the multi-chamber heater with an overhead convection section and stack surmounted on the heater structure.

New Insulation

FOAMGLAS, a cellular glass insulation material developed through the war years as a heat resisting material for use in U. S. Navy fighting ships and vessels of the Maritime Commission, is finding its broadest post-war usage in the petroleum industry.

Manufactured in block form, the product contains ten million cells per cubic foot of inert gas hermetically sealed in glass. The material which is composed of fifteen parts air and one part of glass by volume, is produced by adding finely divided carbon to ground glass and subjecting the mixture to a controlled high temperature treatment.

Of particular interest to the petroleum industry is its resistance to fire. In tests conducted by the Pittsburgh Testing Laboratory, Foamglas successfully withstood a 24-hour exposure to a temperature of 1200°F. The thermal conductivity curve is practically a straight line from —100° to +500° mean temperature wet or dry. Despite its light weight (average 10.5 lbs. per cubic foot), the insulation material has a high compressive strength—about 150 lbs. per square inch.

More than ten separate tests, conducted by private, federal, and independent laboratories, failed to find any water absorption or vapor passage in Foamglas specimens. One test was conducted continuously for 246 days. Besides being moisture-proof, it is impervious to all acids (except hydrofluoric and glacial phosphoric), concentrated or dilute. Basic in character, it will not cause or accelerate corrosion as it is chemically stable.

Recommended by the manufacturer for insulation of vertical tanks and towers up to 800°F is the application of Foamglas over which shall be applied a layer of wire mesh and Pittcote finish. Slabs two inches thick are sufficient for temperature ranging to 300°F.; three inches to 600°F.; and four inches to 800°F.

Monsanto's New Additives

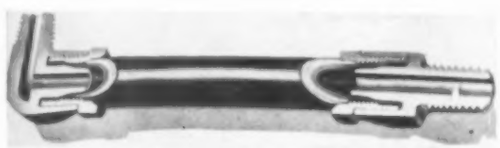
THE MONSANTO CHEMICAL Company announces the following new developments in lubrication additives:

Pour Depressant: SANTOPOUR B is an improved pour depressant designed to overcome problems encountered in particularly cold climates with pour reversion, i.e., the phenomenon of a gradual solidification of oil in storage when exposed to fluctuating temperatures below the cloud point. This new pour depressant has generally improved potency in a wide range of base stocks.

Antioxidant and Bearing Corrosion Inhibitor: SANTOLUBE 394-C is a phosphorus-sulfur organo compound of great effectiveness in inhibiting the corrosion of hard alloy bearings under extreme service conditions and stabilizing lubricating oil against oxidation with the concomitant formation of corrosive acidic constituents and decomposition products such as lacquer and sludge. This additive is of particular interest at the moment for enabling base stocks to meet the minimum quality requirements of a premium motor oil.

Detergents: SANTOLUBE 203-A is a detergent or dispersant-type metallo organo compound of excellent performance characteristics for the blending of a motor oil suitable for high-speed, high output Diesel engine service. Combination of this additive with SANTOLUBE 394-C (see above) has been approved for the formulation of U. S. Army Specification 2-104B and these ready blended additives are marketed as SANTOLUBE 204 and SANTOLUBE 205. SANTOLUBE 204 is also qualified in suitable base stocks for the Navy 9000 series. These additives are also extremely effective in intermediate concentrations for blending premium motor oils and oils suitable for medium truck and bus service.

Gear Lubricant Additivev: SANTOPOID R—This gear lubricant additive was developed to meet the requirements of U. S. Army Specification 2-105B which defines lubricants of satisfactory performance characteristics for both low-speed, high-torque, heavy duty truck axle service and the high-speed deceleration requirements of the passenger hypoid axle.



Reusable Hose Couplings

ANNOUNCEMENT is made by Resistoflex Corporation of a complete line of patented attachable-detachable reusable metal couplings, which now make it possible to hand-assemble flexible hose lines. Combined with any flexible hose — preferably with compar-lined gas-oil hose because it is impervious to gasoline, organic solvents and oil — these reusable couplings properly attached can be trusted never to let go or vibrate loose. They are easily and quickly attached or detached.

The coupling nut threads onto the hose, with coupling shell compressing the hose end into a safety-seal gasket. With keep-true threads, the fitting has a long even grip on the hose, the double bell shape of nut allowing hose to flex without cutting. The heavy body of the fitting prevents crushing or distorting of the line. Unusually large square wrench surfaces make assembly operation simple and quick.

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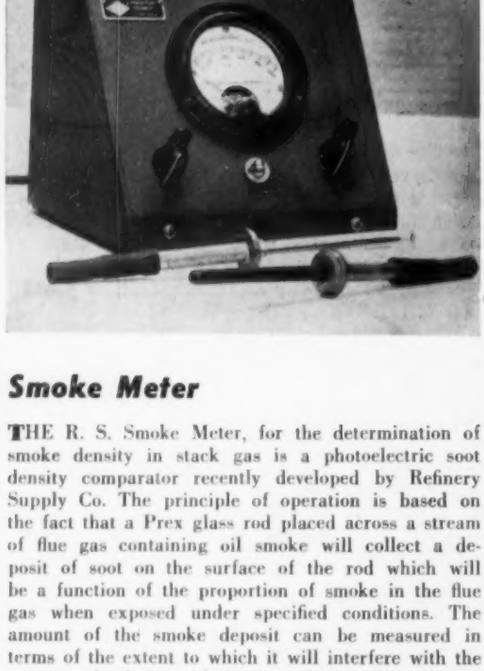


Smoke Meter

THE R. S. Smoke Meter, for the determination of smoke density in stack gas is a photoelectric soot density comparator recently developed by Refinery Supply Co. The principle of operation is based on the fact that a Prex glass rod placed across a stream of flue gas containing oil smoke will collect a deposit of soot on the surface of the rod which will be a function of the proportion of smoke in the flue gas when exposed under specified conditions. The amount of the smoke deposit can be measured in terms of the extent to which it will interfere with the passage of a beam of light through the glass rod into a photoelectric cell.

In operation the smoke meter is adjusted for "zero" reading with a dull black rod in the light tube. Then the meter is adjusted for "100" reading with a clean Pyrex glass rod in the light tube. After the Pyrex rod has been exposed to the flue gases it is replaced in the light tube and the meter will give a reading indicating the percent light transmitted.

Demand-Type Oxygen Mask

MINE SAFETY APPLIANCES COMPANY announces the production of a new Demand-Type Oxygen Mask for respiratory protection in unbreathable atmospheres. The mask is a cylinder-type oxygen breathing apparatus. It is always ready for use and requires no special training or practice for operation: the wearer needs only to put on the mask, open a valve, and breathe.

These masks are of two types. One type has an oxygen cylinder on the wearer's back supported by a comfortable adjustable harness. Enough oxygen is supplied for approximately one hour of normal breathing. Also available is a front sling model with smaller cylinder for shorter periods. Both models provide oxygen exactly as needed by the individual wearer. This control is made possible by the demand regulator with which the mask is equipped—the same regulator supplied by this company to the armed forces for altitude flying.

The mask is also equipped with a pressure gauge which indicates the amount of oxygen in the cylinder at all times. The breathing tube is quickly disconnectable for conservation of oxygen during stand-by periods. Fogging of the mask's all-vision facepiece is prevented by a flow of cool oxygen over the lenses.

Infrared Spectrophotometer

BASED upon the experience gained from the many refinery applications of the pioneer Beckman Infrared Spectrophotometer, National Technical Laboratories have developed a new instrument (Model IR-2) incorporating many far-reaching advancements in accuracy, adaptability and simplified operation.

This new instrument is adaptable to a wide range of general applications. It is equally suitable for routine analysis or research investigations on gases, liquids, or solids. Unusual versatility is provided by interchangeable elements. Various types of light sources, cell nolders, etc. can be readily changed. Even cells with path-length of a meter or more can be used.

Through use of a new energy measuring system employing a bolometer and vacuum tube amplified, errors and vibration difficulties that are characteristic of conventional thermopile-galvanometer systems are eliminated.

To eliminate the uncertainty of inadequate temperature compensation methods and need for a constant-temperature room, the monochromotor and cell compartments are completely thermostrated. Quick and easy readings can be made directly in both percent transmission and optical density. Provisions are made for direct-connecting a standard potentiometer-type recorder. Wave lengths can be selected either by a continuous wavelength drive calibrated directly in microns or by a 17-position stop mechanism that simplifies routine operations. Accessory equipment includes a motor drive for continuous wavelength scanning.

Another important advancement is a photo-electronically stabilized Nernst lamp which insures a constant source of radiation at all times, regardless of line voltage fluctuations. The optical path of the instrument is hermetically sealed so as to be completely free of CO_2 and water vapor. Two-stage drying protects the precision optical elements against the effects of dampness and humidity.

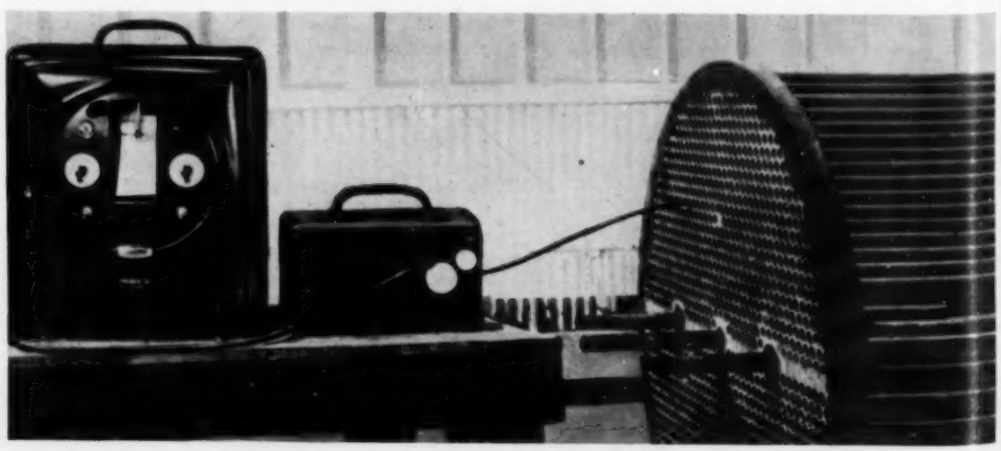
Probolog, for Inspecting Tubes

ONE of the most serious problems of engineers in oil refineries, chemical plants, power plants, aboard ship, and in the countless modern industrial installations which employ tubular heat exchange equipment has been the constant threat of failure of this equipment in service due to internal corrosion. Such failures have on many occasions resulted in serious accidents with loss of life and destruction of equipment and from day to day levy a heavy toll in terms of lost production due to forced plant shutdowns.

The Shell Development Company, subsidiary of the Shell Oil Company, has developed an inspection device, called the "Probolog", for testing non-magnetic tubes without removing them from the equipment in which they are installed. By using the device, it is possible not only to locate quickly and accurately faulty, inaccessible tubes in heat exchangers, condensers and similar tubular equipment, but to obtain a graphic record of the defects as well.

How the Probolog works: A probe is pushed or pulled through a tube by a cable. As it moves through the tube, the recorder charts or flashes the position of each defect in the tube.

The Probolog detects dezincification, eroded and corroded pits, cracks, strained areas increases or decreases in wall thickness, changes in alloy or chemical composition and abnormal changes in physical dimensions — a complete record in black and white.



PRODUCING EQUIPMENT

MANUFACTURERS ANNOUNCING MANY NEW DEVELOPMENTS

A good deal of fun was poked at the "post-war planners" before V-E Day. The jokesters had a lot to say in a facetious vein about the "brave new world" which was to be enjoyed as soon as the war was over. Now that the war is finally over the fruits of post-war planning are becoming more evident month by month. There still are many announcements which have been delayed because of reconversion troubles but, on the other hand, there have been a surprising number of new developments designed to save money, time and labor, increase safety and, indeed, make possible producing operations which were impossible before the war.

Steel companies are releasing commercially the results of war-time research in higher tensile steels. One company, for example, recently announced a 95,000 pound steel which will be particularly helpful in safely casing deeper wells. High pressure encountered in today's 12,000-foot wells have caused the industry to take a keen interest in methods of examining tubular goods for defects such as seams, overlaps, slag inclusions and the like.

Corrosion troubles in high pressure condensate-type fields have been responsible for development of internal tubing calipers for detecting the extent of metal loss. A new "aluminized" steel said to be more resistant to salt water and sour crude corrosion is a steel industry proposal to help.

In pumping wells in sour crude areas tantalum-columbium carbide balls and seats have been used recently. Magnesium metal is back from the wars for use in cathodic protection of pipelines.

War-time developments in plastics and oil resistant synthetic rubbers are being studied widely as a means of protecting steel. Storage tanks particularly are suggested for protection by oilproof plastic coverings.

Stand-by slush pumps directly connected with 50-horsepower engines and mounted on skids have been assembled for emergency use in case of unexpected shut-downs. These emergency units are not powerful enough to permit drilling to continue but are useful to maintain circulation and prevent freezing of drill pipe during emergencies of substantial duration.

A single small engine has been installed on many rigs recently to drive the air compressor, dynamo or a small pump. Usually one of these units is in operation at one time but drives have been designed so that any two may be operated simultaneously.

Another application for an individual motor on the drilling rig has been for rotary table operation. Instead of running all power through the drawworks small motors are directly connected through a shaft and worm gear to the rotary table. This reduces wear on the chains, drawworks transmission and the large engines which need be operated only for the heavy trip work most of the time.

Wear on tool joints is being reduced by applying small wearing bands of tungsten carbide around the boxes. New tool joints now are being delivered by some manufacturers with the bands attached. Tool joint life has been doubled in some instances by the bands.

Wells sunk to 12,000 feet and below are putting excessive loads on slush pumps. Separate prime movers have been utilized to develop the necessary high pressures and newly designed pumps are being manufactured specifically for 15,000-foot wells. For drilling to today's deeper horizons pumps capable of circulating 300-750 gallons of mud per minute at pressures of 1,100 to 2,900 pounds per square inch are required.

Auxiliary equipment to ease the work for roughnecks as well as to speed trips include such items as air-operated slips and special purpose catheads.

The driller has not been overlooked by the manufacturers. Air controls and air friction clutches have reduced manual labor and have simplified controls so that operations have been speeded; air foot throttles enable him to operate the critical controls while hoisting and at the same time keep an eye on the blocks. Electrically operated rigs have accomplished the same results by putting all controls within easy reach of the driller.

Greater power requirements of newer rigs have resulted in development of devices for compounding gasoline or diesel engines. Use of multiple power units has given greater flexibility than was possible when using only one or two prime movers. Hydraulic torque converters have been applied on medium sized power rigs to give easy control, speed hoisting operations and reduce maintenance.

Moving and rigging time has been reduced materially by mounting various parts on skids. When a well is completed, disassembly is both simpler and far less time consuming than formerly. And when the equipment arrives at the next location it cannot be mistaken for a moving junkyard.

Manpower scarcity during the war and higher wage rates have been important elements in the development of much of the new equipment coming on the market today. Take well servicing as an example. Portable well servicing units are being brought to a high state of perfection. Derricks fold back over the truck cab for quick moves. Tubing may be stood-up in doubles and rods hung in doubles in portable derricks. This saves considerable time when compared with the old method of laying both tubing and rods horizontally on supports.

The desire for speed in rigging and dismantling has resulted in numerous other new items of equipment. An example is unitized blocks combining functions of a traveling block, free swiveling hook or link adapter and equipped with a single pin which may be pulled to open the blocks for applying lines to sheaves.

Dual completions in high pressure producing zones have presented special problems. Some of these have been solved by special valves permitting reentering of wells after completion without killing pressures with water or mud. One special valve of this general type permits shutting in a high pressure well without severing the wire line. New fishing tools have been forthcoming to meet special problems. Greater use of externally upset drillpipe has resulted in the design of a new overshot with a special bowl for such fish. Special devices have been announced for preparing wells for cementing operations and for directing cement slurry exactly where it is needed without settling into lower permeable zones or backing up the pipe to unwanted heights.

The shorter work week and higher wages have made it essential, also, to group more pumping leases and reduce attendance on the part of the pumper. This necessitates automatic shut-off of pumping machinery in case of accident if equipment is not to be damaged from time to time. The shut-down devices stop pumping engines automatically if the rods part, pitman comes off or if there is any failure tending to impart an unsteady motion to the beam. By installing time shut-down devices it is possible to shut off pumping individual wells at a predetermined time after the pumper has gone on to another property or returned to the bosom of his family.

Even before the war it was found that slow speed horizontal engines of small horsepower were valuable for pumping service, particularly on wells being pumped continuously. These engines in 10, 15 and 20 horsepower, operating at slow or medium speed with a big flywheel, now are being made by a number of companies.

In some fields where small volumes of gas are available for gas lift or gas injection projects producers have successfully used small horsepower (75 to 255 hp) heavy duty compressor units developed specifically for this use. By mounting these compressors on skids the manufacturers have simplified installation. Force feed lubricated stuffing boxes for beam pumping wells have simplified maintenance.

The following pages contain a brief summary of some of the new developments offered to the oil industry by the equipment manufacturers.

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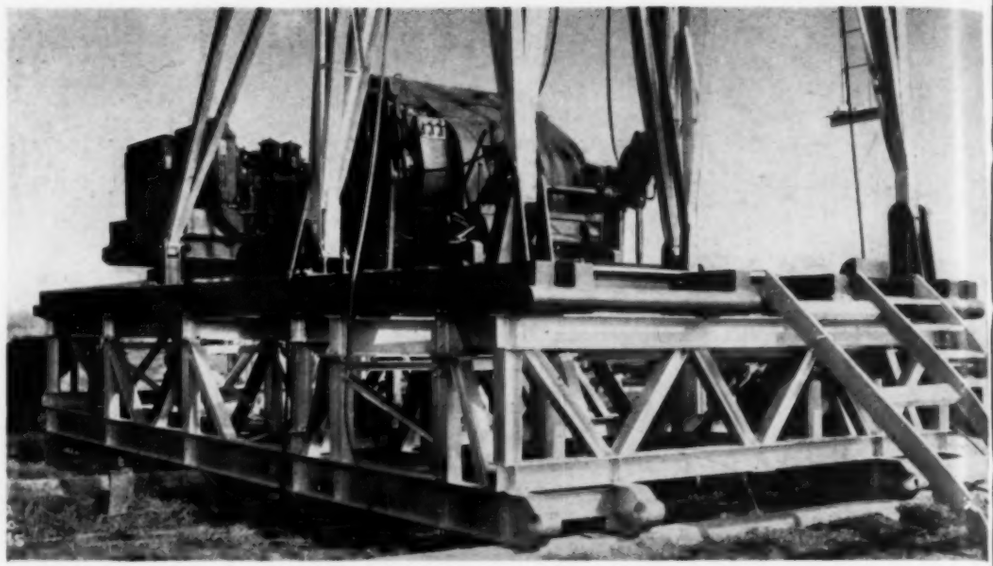
Emsco G-500 Drilling Rig

THE Emsco G-500 Drilling Rig is a 500 horsepower portable drilling unit, consisting of compounding transmission, drawworks with built-in selective transmission, engines, slush pump and the necessary mounting members.

The compounding transmission is a two-engine three-shaft, or three-engine four-shaft one-piece assembly, mounted on the main skid base and flange bolted to the drawworks. All drives are precision roller chain lubricated by a circulating oil system. The slush pump drive v-belt sheave and Airflec friction clutch are mounted on the inboard extension, a separate shaft of the transmission.

The drawworks, with built-in selective transmission, has six hoisting speeds, three rotating speeds, and three catshaft speeds. The reverse of the transmission provides two reverse speeds to the drum, one to the rotary drive and one of the catshaft. The drum brake is of the full wrap type, having 350° contact on each of the 42-inch diameter brake rims. The brake mechanism has a 54 to 1 linkage ratio, with the brake handle at a 45° position. The entire linkage mechanism is mounted on bronze bushings and Alemite lubricated from a central point on the drawworks. The brake shaft is mounted on needle bearings and is also Alemite lubricated. The high speed drum clutch, the rotary clutch and the master clutch are direct air operated friction clutches, controlled from the driller's position by variable pressure regulating type control valves. The low speed drum clutch is a multiple tapered jaw clutch, operated mechanically from the driller's position. The selective transmission clutches are multiple jaw type, operated by a single selective hand lever at the driller's position. A neutral brake controlled from the same valve as the master clutch stops rotation of transmission shafts for engagement of the selective clutches. Gauges are mounted at the driller's position, directly above the central panel, which indicate at all times, air pressure, lubricating oil pressure, brake cooling water pressure and a dual gauge to show the vacuum of the suction manifold of each engine.

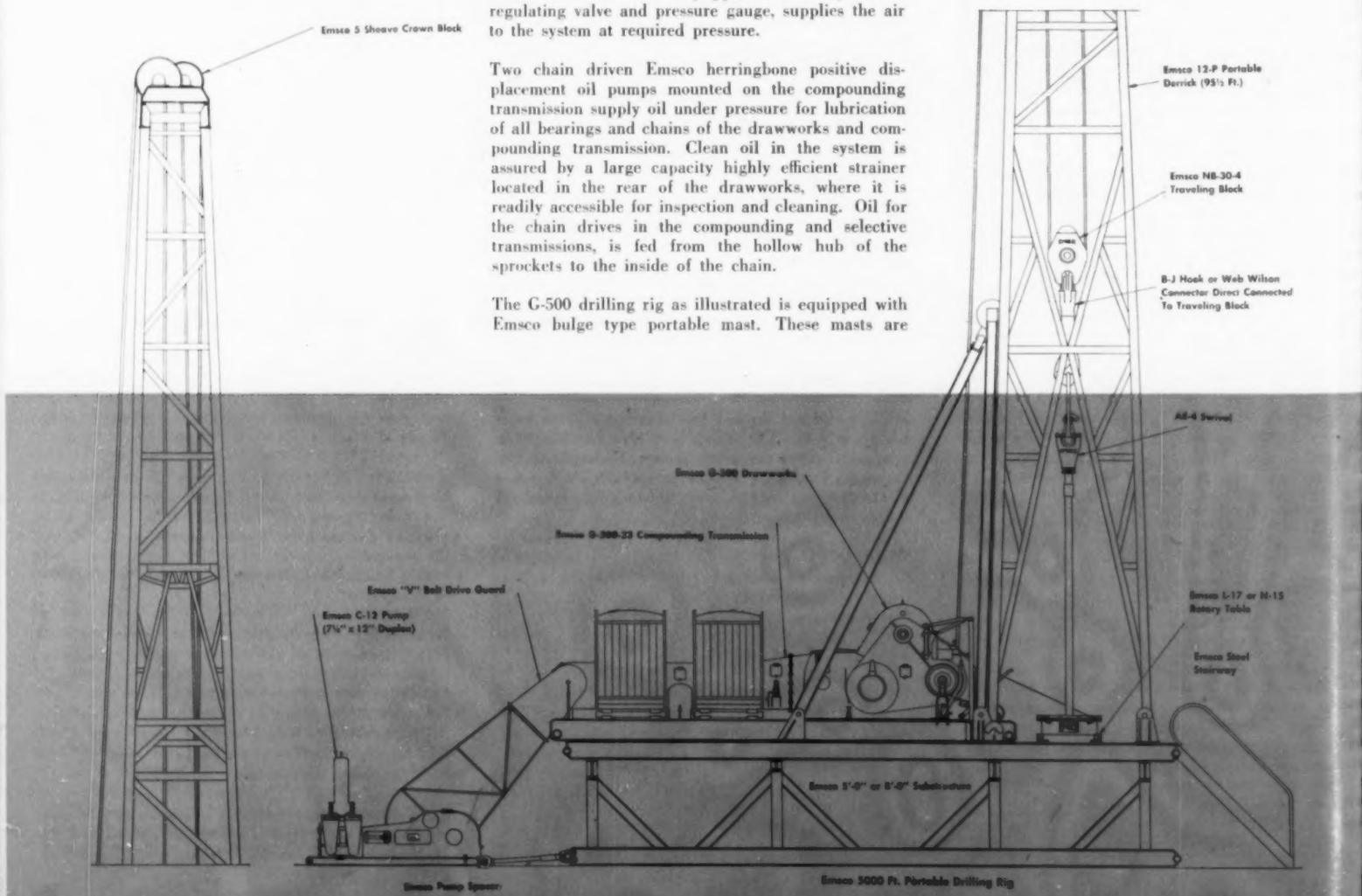


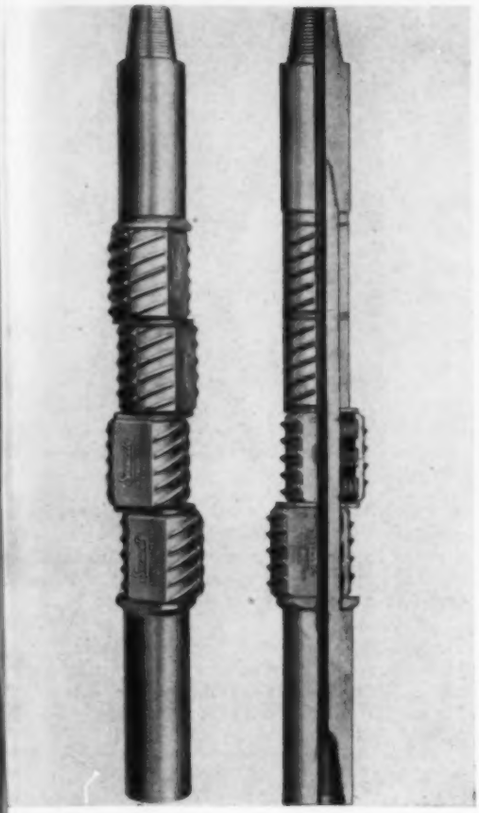
500 HP, 5000 ft. Portable Drilling Rig

Air for operation of the friction clutches, is provided by two air compressors mounted on the compounding transmission and driven by v-belts from two engine shafts. A volume tank equipped with safety valves, regulating valve and pressure gauge, supplies the air to the system at required pressure.

Two chain driven Emsco herringbone positive displacement oil pumps mounted on the compounding transmission supply oil under pressure for lubrication of all bearings and chains of the drawworks and compounding transmission. Clean oil in the system is assured by a large capacity highly efficient strainer located in the rear of the drawworks, where it is readily accessible for inspection and cleaning. Oil for the chain drives in the compounding and selective transmissions, is fed from the hollow hub of the sprockets to the inside of the chain.

The G-500 drilling rig as illustrated is equipped with Emsco bulge type portable mast. These masts are made in two sizes under the designations of 12P and 17P respectively for the 94 and 129 foot heights. The 12P is designed for handling pipe in doubles and the 17P for handling pipe in trebles. Top dimensions are the same for both masts and crown block assemblies are interchangeable. The patented bulge feature allows racking of the drill pipe inside the mast. It also provides additional clearance for the derrick man's platform and movement of the traveling block.


Emsco 5 Sheave Crown Block
Emsco 12-P Portable Derrick (95½ Ft.)
Emsco NB-30-4 Traveling Block
B-J Hook or Web Wilson Connector Direct Connected To Traveling Block
All-4 Swivel
Emsco G-500 Drawworks
Emsco G-500-22 Compounding Transmission
Emsco "V" Belt Drive Guard
Emsco C-12 Pump (7¼" x 12" Duplex)
Emsco L-17 or N-15 Rotary Table
Emsco Steel Stairway
Emsco 5'-0" or 8'-0" Substructure
Emsco Pump Spacer
Emsco 5000 Ft. Portable Drilling Rig



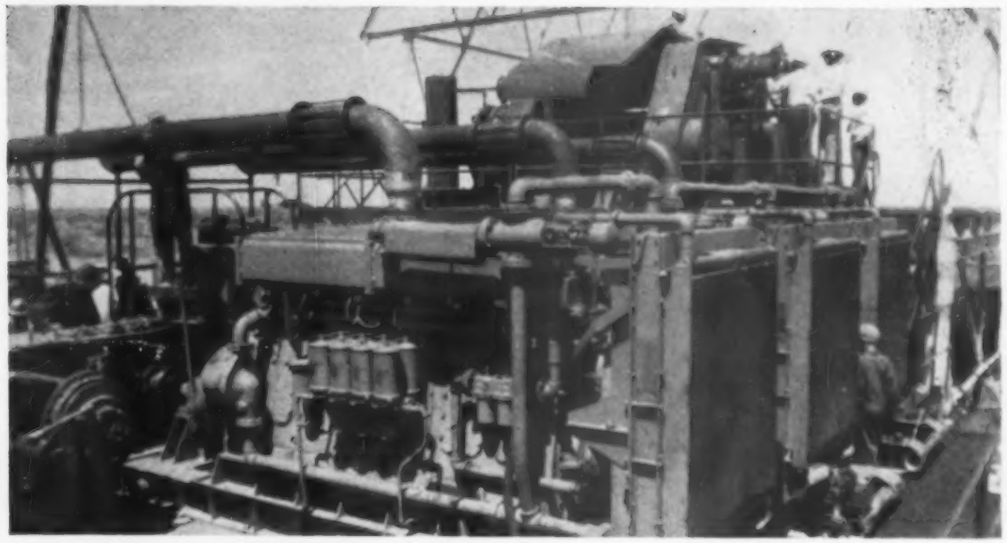
New Security Casing Scraper

EMPLOYING an effective angle of shear, the new Security Casing Scraper of the Security Engineering Co., Inc., does a superior job of removing obstructions and foreign matter from within the casing walls, thus assuring at all times free down-ward passage of tools and equipment.

The design of the Security Casing Scraper is simple (see illustration). Four reversible cutters, having rectangular openings through the center, are slidably mounted on a square mandrel. These are expanded against casing walls by strong coil springs, which fit into each cutter and exert pressure between the cutter and mandrel. Cutter teeth bear firmly against the casing walls and insure full gauge contact at every point. Cutters are separated by spacers so constructed that circulation readily bypasses the cutters, but debris is prevented from entering the spring recesses. The multiple cutter teeth contacting the casing throughout their length make certain that every inch of casing is thoroughly cleaned.

Cutters are equipped with two complete sets of teeth separated 180° on the cutter body. Since the cutters do not rotate on the square mandrel, only one side of each cutter contacts the casing at any one time. After considerable use, the cutters can be reversed to utilize the opposite cutting teeth, thus renewing sharpness and restoring original operating efficiency.

Among advantages of the Security Casing Scraper are that during rotation the helical cutting teeth shear all protrusions instead of exerting a scraping or crushing action. Gun perforations, for example, are not burred over but retain their full opening. The cutters are expanded to the full inside diameter of the casing by positive spring pressure and contact approximately 360° of the casing circumference at all times. The multiple spiral teeth cannot pass obstructions without indicating their presence to the operator. Every point in the casing contacts the cutting teeth which removes each burr and every particle of cement by a powerful shearing action. The teeth act upon an obstruction approximately 800 times under average conditions.



Cooper-Bessemer's Type FW Diesel

THE Type FW 6-cylinder Diesel, manufactured by the Cooper-Bessemer Corporation, is a four-cycle engine, designed to withstand the most gruelling service. This engine has a 9" bore and 10½" stroke; is rated 325 to 500 hp for the atmospheric engine, 465 to 600 hp for the supercharged engine—both ratings at 800-1000 rpm.

The compact structure of this engine lends itself readily to skid-mounting, together with accessories and generators, if desired, for portable oil field use. Notable features are: the unusually strong frame and base, cast of tough Meehanite metal; the underhung crankshaft; throughbolts which pass through the main bearing caps and cross-tie the frame; an especially large crankshaft—the diameter of the shaft exceeding 80% of the bore; extra large main bearings, located in the cross ribs of the frame; massive, die-forged steel connecting rods, ribbed for added strength and rigidity.

Another notable detail of design is that the entire cylinder and head assembly is cast as one piece. This casting includes: a jacketed cylinder; a cylinder head which contains two exhaust and two intake valves, an air starting valve, and a fuel injection nozzle; supports for rocker arm parts and for a fuel pump. Main valves and fuel pump are actuated by pushrods from a camshaft which is within the main frame. The cylinder and head assembly is held securely to the engine frame by four studs. The engine camshaft, water pump and other accessories are driven from the crankshaft through a series of gears. This entire accessory drive assembly is enclosed within the engine main frame at the flywheel end.

Fuel injection is by means of jerk pumps, requiring only a short high-pressure fuel line to the injection nozzle. An over-size centrifugal water pump and a large water header assure an abundant flow of cooling water at all times. The engine is pressure lubricated throughout.

Mud Mixer

A PIECE of new equipment which the Mid-Continent Supply Company calls a "Muderator" is intended to give the driller mud of uniform viscosity, safety in mixing chemicals, economy in the use of ingredients, easy bulk mixing, cleaner operation, economy of the time of crewmen, with the general result of having the mud flow exactly right.

The muderator is set up under a shelter near the rig. The dry mud or other material to be added to the mud stream is placed in the hopper. A 2-inch by-pass line is run from the circulating pump and connected to the 2-inch wing on the muderator. Then a 4-inch exhaust line is laid from the muderator to the mud pit so that it will discharge into the pit near the pump section. The flow of light mud is started through the muderator by opening the valve in the by-pass mud line. The vacuum control valve is given a quarter-turn to break the vacuum and create a flow of air through the mixing chamber. The control valve on the pick-up nozzle is given a quarter or half turn and the nozzle is pushed deep into the hopper. The muderator then operates by pressure of the main circulating pump or a stand-by pump and the mud is mixed by vacuum.

When necessary to mix bulk material, the hopper may be quickly screwed onto the top of the vacuum chamber. If desired, dry mud may also be fed into the mixture by attaching the suction hose to the vacuum control valve and inserting the pick-up nozzle into dry mud.

The rate of intake of the dry mud is regulated by the control valve on the pick-up nozzle. To increase the intake of dry mud, open the valve wider on the pick-up nozzle. One hundred pounds of weight material can be handled in 1 on 1½ minutes by using the ⅞" jet with the pick-up nozzle control valve wide open.

If even greater speed in mixing is desired, two Muderators in a twin or manifold installation may be used.

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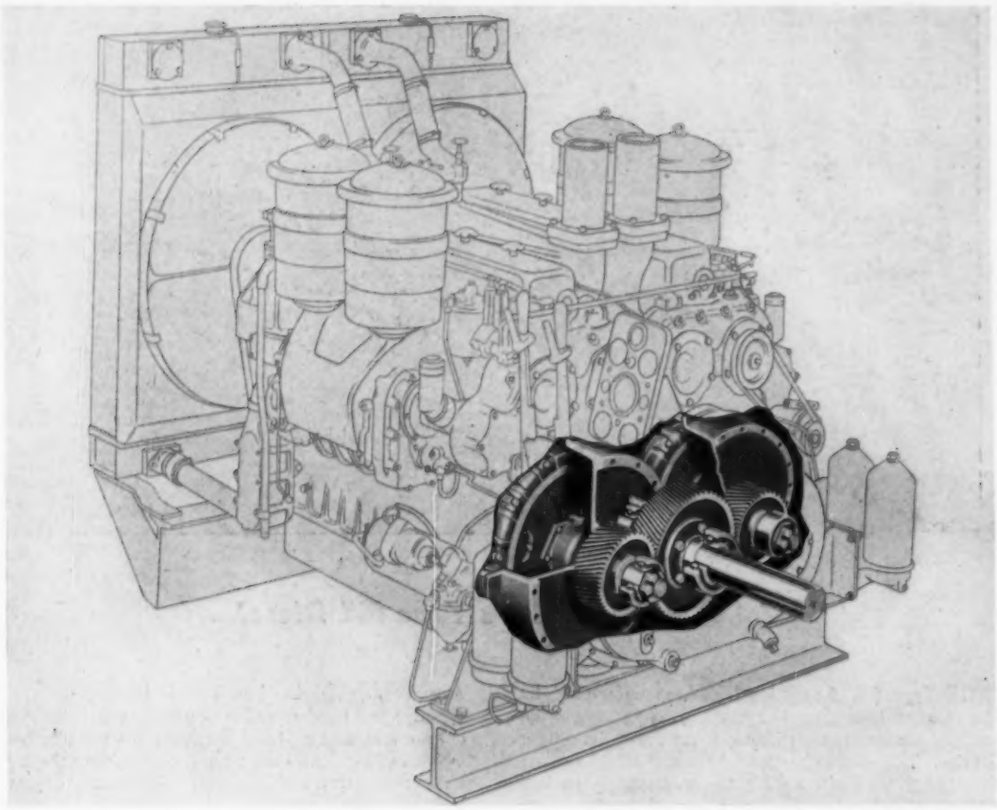


Multiple Diesel Oil Field Engines

THE Detroit Diesel Engine Division of General Motors Corporation has announced its new line of composite or compound Diesel Engines for oil field use. This line contains the "Twin 6" (model 12101) and the "Quad 6" (models 24101 and 24102). The "Quad 6" consists of four basic GM Diesel 6-71 engines mounted together and delivering power through a single drive shaft. The "Twin 6" consists of two such engines.

In either case one or more of these engines may be declutched when the load is light. Or they may be clutched in together when a large amount of power is required. This combination makes it unnecessary to have separate engines for light and heavy work. They thus put at the disposal of the driller the ability to drill a well as deep as he wishes to go, and they afford the flexibility needed for draw-works and a wide range of speeds to drive the rotary table. By alternating the use of the engines or through declutching, efficient and economical operation may be obtained to suit conditions. Owing to their compactness in comparison with other forms of drilling power they are easy to move from place to place and simple to hook up.

Each of the basic units making up these multiple engines has an individual clutch and throttle. All parts requiring periodic inspection or cleaning are easily reached and can be quickly serviced.

Continuous BHP rating in continuous operation at 1600 RPM for the "Twin 6" is 260; maximum power output 596 HP. For the "Quad 6" the continuous rating is 520 and the maximum power output is 596 HP.

The accompanying illustration, in phantom view, shows how the power is transmitted from two 6-71 2-cycle engines to the power take-off shaft of the Twin 6. The driven plates of the heavy-duty dry disc clutches are splined to shafts, each of which carried a helical drive pinion. The two drive pinions mate with a common helical driven gear on the power take-off shaft. There are bell bearings on both sides of the drive gears and the driven gear is straddle-mounted on ball bearings.

The power transmission arrangement in the "Quad 6" is similar to that in the Twin. The driven gear and the drive pinions are all of the herring-bone type. The drive pinions are carried on ball bearing-counted splined shafts, each of which engage the driven clutch face of two engines. The driven gear is also straddle-mounted by ball bearings. The main drive shaft is connected to the driven gear shaft through a coupling, and it is supported at the power take-off end by a self-aligning roller type pillow-block bearing.

Pressure Seal Wire Line Valve

DESIGNED for use in any operation where tools or instruments are run in wells on wire line under pressure, the OMSCO Pressure Seal Wire Line Valve, manufactured by Oilfield Machine and Supply Company, permits the operator to shut in the well without severing the wire line. This valve is applicable for use in running all wire line units for bottom hole pressure bombs, chokes, safety valves, paraffin scrapers or bottom hole samplers, and in fishing for those tools. Tested to 6000 lbs., the OMSCO Line Valve has a full 2½ inch opening through the valve and is installed below the lubricator. The built-in equalizing valve eliminated cumbersome outside lines. The pressure seal feature of it is unique in that it requires no adjustment, As more pressure is applied against the rams when the valve is closed, the rams seat even tighter. Rams are opened or closed by a 90 degree turn of the ram arm.

The quick opening feature saves considerable time on jobs where multiple runs of tools or instruments are made. Rather than close the master gate of the Christmas tree between runs, the well may be closed in by a quick turn of the ram arm.

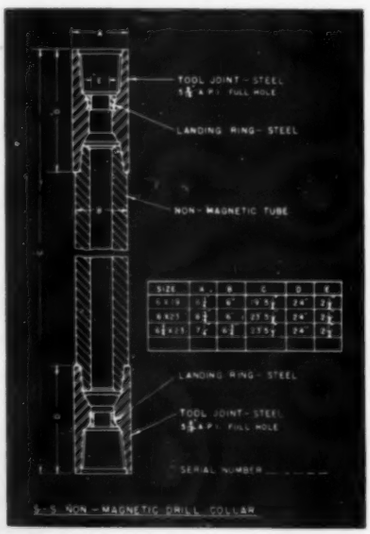
There are other advantages. In event the packing in the stuffing box on top of the lubricator fails, for example, the OMSCO wire line valve may be closed around the wire line. The well is thus shut in, allowing the operator to repack the stuffing box. In fishing operation the valve, in many instances, will avoid losing the fish, since the operator may shut the well in without severing the wire line. When the fish is caught and pulled to the top of the hole, the fishing tool will be in the lubricator while the caught fish is still below the master gate. With the OMSCO wire line valve the fish may then be removed by closing the valve, breaking out the stuffing box to remove the fishing tool, replacing the stuffing box and then come out of the hole with the fish.

New Drilling Engine Governor

DEVELOPED during wartime, the electro-hydraulic governor for diesel engines has been applied advantageously to a new, large diesel engine oil-well drilling equipment, built for exploratory drillisg to 15,000 fe The equipment includes three 375-kw diesel-driven

generators, a 1,000-hp drawworks motor, two 500-hp mud-pump motors, one 300-hp rotary-table motor, and one 300-hp coring-reel motor with all of the motors of the heavy-duty steel-mill type. The three d-c generators may be paralleled to supply the 1,000-hp motor or individually operated to supply the other motors at the option of the driller. Speed control of the various motors is obtained by amplidyne field control of the generators. The adjustable torque limit provided for the driller by this application of amplidynes is particularly important in limiting the available torque on the rotary table, thus preventing mechanical breakage of a long string of drill stem.

Having received a signal of engine speed, the new governor adjusts the engine throttle; and thereafter automatically reduces the generator fields to maintain a constant kilowatt load on the engines. With this governor it becomes possible to (1) run the engines at the speed called for by the driller instead of continuously top-rated speed; (2) prevent engine overloading by automatically reducing the generator field; and (3) control all three engines from one driller's master switch—the governors causing the engines to divide the load automatically when they are paralleled. All these features greatly reduce maintenance and fuel consumption. This is an International General Electric Company product.



on-Magnetic Drill Collar

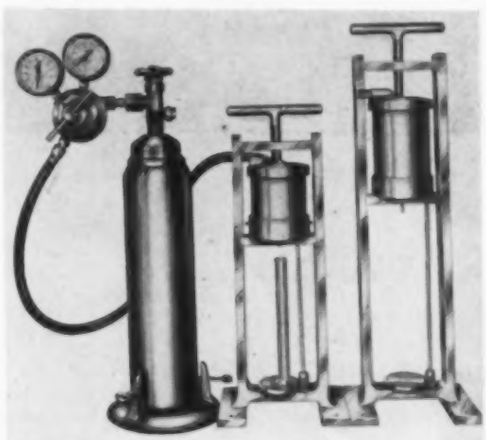
PERRY-SUN WELL SURVEYING COMPANY has ently added to its line of well surveying instruments l services a new service, the S-S Non-Magnetic ill Collar rental.

e use of this drill collar permits the taking of ectional single shot records inside of the drill pipe. ere is no need to remove the drill pipe from the le or to raise the drill string to allow the instrunt to dangle through a specially designed, but fficient, bit.

e S-S Non-magnetic drill collar is located imediately above the regular bit and the non-magnetic tion carries the directional single shot instrument protects it against both loss and damage. The rds obtained are more accurate because the inment, being seated inside of the drill collar, is ays parallel to its walls.

e non-magnetic sections of the S-S drill collar are le of "K" Monel metal, the physical properties of which are as high or higher than those of the best steel used in the manufacture of drill collars made from steel.

Extensive field tests which have been made with the non-magnetic drill collar have demonstrated that by its use directional single shot records can be obtained at a great saving of rig time, that the records obtained are accurate and the operation of the single shot instrument is less hazardous. The use of this collar is particularly advantageous in directional drilling in which the reaching of the sub-surface objective with the least deviation and with the greatest saving of rig time, counts.



Baroid's Shorter Filter Press

BAROID SALES DIVISION announces a new space-saving low pressure wall-building tester or drilling mud filter press. The new apparatus embodies the same principle and most of the same parts as contained in the old tester used in all oil fields to determine the performance or filtration characteristics of drilling mud. However, the new tester stands only 18⅜ inches high, compared with the old one's height of 23½ inches. The frame and the filter cell have been reduced in height to effect the overall reduction, but all the other dimensions remain the same. The new filter cell stands 3½ inches high compared with 5 inches for the old. The internal diameter remains the same for both, which gives the new filter cell a capacity of 24¾ cubic inches (405 cc.) compared with 35-1/3 cubic inches (579 cc.). Operators have found that 400 cc. provides ample capacity for practically all filtration tests.

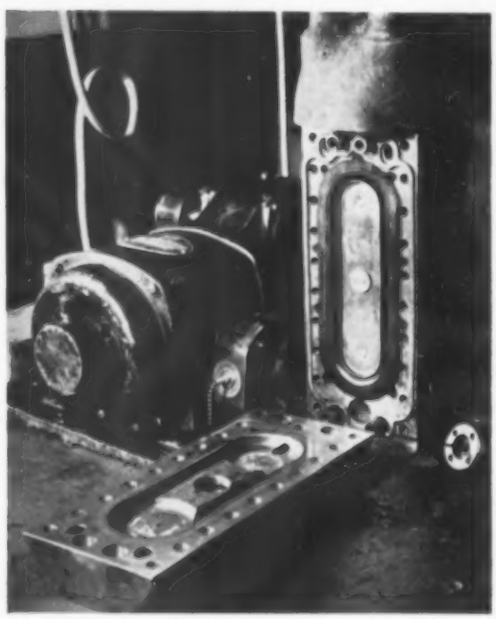
Except for the frame uprights, filter cell, and graduate support rod, all parts of the two testers remain interchangeable. Both types of filtration tester will be available to operators for some time.

Pure Drinking Water in the Oil Fields

IT is an old saying that oil is where you find it, and the places where it is found are very often lacking in modern conveniences for good living. Exploration parties and oilfield men, like other men, need pure drinking water, and if the available supply is not naturally pure, health demands that it be made so.

To meet this need, %Proportioneers% developed for the Army a portable water purification unit which they call their "Pur-O-Pumper." The unit consists of two principal parts, the pumping and treating unit and the filter unit. A pump draws the raw water from any natural source—a pond, a wall or a stream. The unit is now available for civilian use.

As the water is pumped up a chemical feeding device adds the necessary chemical sterilizing agent (calcium hypochlorite solution). At the same time another feeder introduces a slurry of diatomaceous filtering earth. The treated water with its slurry then passes into a chamber fitted with porous filtering stones from which the water issues clear and safe to use. After a time the filter is cleared by backwashing and a new cycle of operation is begun. The Pur-O-Pumper portable water purification unit will handle up to 55 gallons of raw water per minute.



McEvoy Automatic Gas Lift with Synthetic Rubber Diaphragm

Synthetic Gas Lift Diaphragm

THE McEvoy Company is using a Hycar synthetic rubber diaphragm manufactured by B. F. Goodrich Company in its new automatic gas lift. The lift requires no bottom hole pump, sucker rods, surface equipment or prime mover. The gas lift valves are simply made up in the tubing string, and the low pressure gas is diverted from a choke at the surface to the casing annulus. This gas then enters the gas lift valves and is conducted to the fluid column in the tubing, causing it to rise to the surface. The valves are opened and closed automatically by a diaphragm, which is flexed by a differential in weights between the fluid in the tubing and a column of light oil which is provided in the tool itself.

The Hycar diaphragm is the key to the successful operation of the McEvoy gas lift. It must remain flexible and strong in order to open and close the valve and is submerged in oil — on one side by the light oil which helps control the unit, on the other side by the well fluid. Hycar's abrasion-resistant characteristics prevent wear from abrasive particles from the well fluid and its chemical resistance prevents damage from corrosive salt water.

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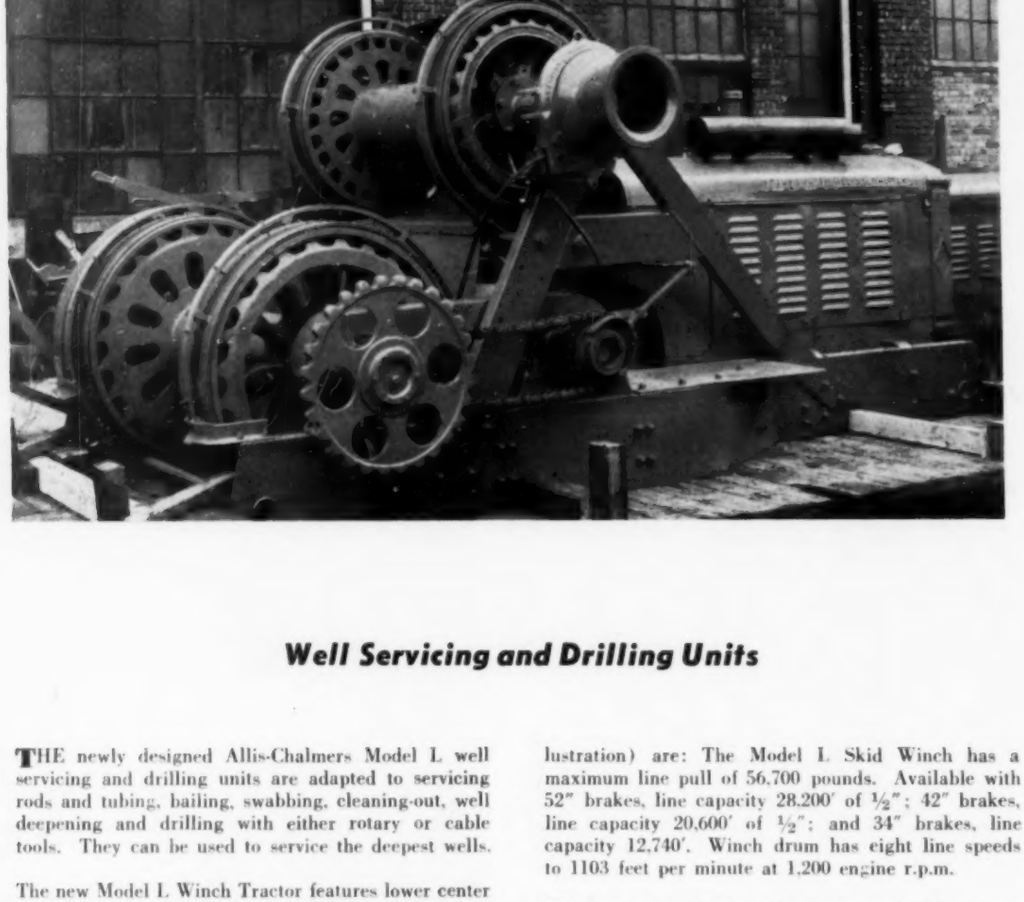


Well Servicing and Drilling Units

THE newly designed Allis-Chalmers Model L well servicing and drilling units are adapted to servicing rods and tubing, bailing, swabbing, cleaning-out, well deepening and drilling with either rotary or cable tools. They can be used to service the deepest wells.

The new Model L Winch Tractor features lower center of balance; easier steering; longer wheel base; higher road speed and greater traction area.

Specifications for the Model L Skid Winch (see illustration) are: The Model L Skid Winch has a maximum line pull of 56,700 pounds. Available with 52" brakes, line capacity 28,200' of ½"; 42" brakes, line capacity 20,600' of ½"; and 34" brakes, line capacity 12,740'. Winch drum has eight line speeds to 1103 feet per minute at 1,200 engine r.p.m.

This unit is available with single or double drums, cathead, rotary drive and spudding equipment. Units are equipped with Cooper patented circulating air cooled brakes, self-emergizing and fully equalized.

New Side Hole Cutter

AS shown in the illustration, the Globe Side Hole Cutter, made by Globe Oil Tools Company, is installed immediately above the drilling bit, the cutting members then being less distance off bottom than the diameter of the hole. It is a complete one-piece unit, has no moving parts, and can be run on every type of drilling bit. Its advantages are:

1. Eliminates reaming as a separate operation, by reaming and milling the sides of the hole while drilling. Its reaming ability is due to the 10 and 12-point side hole contact. The long teeth insure thorough side hole cutting instead of grooving, thereby preventing "tight" spots.

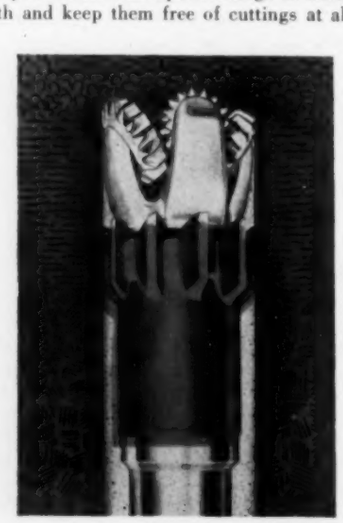
2. Maintains full-gage hole all the way to bottom while drilling, the hole being milled to predetermined size.

3. Saves the driling bit, enabling it to stay on bottom longer and drill more footage of full-gage hole faster. When a new bit is run in it does not have to ream hole already drilled, but starts digging on bottom where the previous bit left off.

4. Stabilizes the drilling bit, preventing it from walking around on bottom, or the hole from going off vertical in any formation. It may also be used several stands above the drill collar to stabilize the drilling bit and avoid stuck drill pipe as a result of heaving shales.

5. Reduces torque on drilling bit. By preventing tight hole conditions, it reduces the strain on drill pipe and eliminates possibility of twist-offs.

6. Cannot "ball-up" in sticky formations; the shape of the tool permits the full upward surge of fluid to pass the teeth and keep them free of cuttings at all times.



Eastman Pre-Cementing Reame

THE Eastman Pre-Cementing Reamer Bit is a n tool for preparing a section of well bore for cementi and for subsequently cementing this section with the necessity of removing the drill string.

A round-trip of the drill pipe between the "prepa tion" operation and the "cementing" operation made unnecessary through the use of this ream thereby overcoming one of the principal difficult and delays encountered in the sidetracking o well bore.

The reamer bit is constructed to prepare the well b by means of a simultaneous scraping and washi action which removes all of the heavy mud and w cake from the section of hole to be cemented. T thorough cleansing action assures minimum conta nation of the cement pumped into this section. gether with maximum bondage between the cem and the wall of the well bore.

The Eastman Pre-Cementing Reamer Bit consists two parts: the body of the tool and a retrieva center plug. The inside diameter of the body of t tool is the same as the inside diameter of the t joints on the drill pipe with the exception of a sli shoulder in the lower end of the body which preve the retrievable center plug from falling out of body during the "preparation" operation. In ope tion, an Eastman Pre-Cementing Reamer Bit is lected of the proper size for the drill pipe and hole. The tool is made up on the drill pipe with retrievable center plug in place and the assembl lowered into the well bore to the upper level of section to be reamed. Circulation is then establis and rotation started. A rotary speed of 30 to 40 r.p and a circulation pressure of 250 to 500 lbs. square inch, varying according to the formation b reamed, are recommended.

The circulating pressure through the ports on the of the body gives horizontal thrust to the drill p forcing the reaming blade into contact with the w of the hole. As the drill pipe rotates, the circulat fluid is forced through the holes and washes the w of the well bore, thereby combining an effective w ing and scraping action to achieve the desired res

When the section of the well bore has been rea the retrievable center plug is removed with a wire overshot, leaving an almost full hole opening thro which the cement may be pumped. The hole is cemented in the conventional manner. There ar present three sizes of this tool: 5½, 7¼ and 8 inc

New Cable Control Unit

PRODUCTION of a new single drum, front-mounted cable control embodying a smooth performing multiple disk type clutch is announced by Caterpillar Tractor Co. Simple, easy operation of the new bulldozer for "Caterpillar" D8, D7 and D6 Tractors is possible with this new No. 24 front single drum cable control, whose line pulls are ample to meet the most severe service requirements imposed by bulldozer operation.

Feet per minute line speed, bare drum, is 357 for the D8, 375 for the D7 and 525 for the D6. F.P.M. line speed, full drum, is 527 for the D8, 552 for the D7 and 780 for the D6. Drum diameter for all three models is nine inches, length 2½ inches, and drum flange diameter 14 inches. The cable size is ½ inch. Drum capacity is 75 feet and the clutch has 12 friction surfaces with an area of 564 square inches.

Clutch facing is metallic and the brake band diameter and width in each model is 15x2½ inches. The effective brake area is 111 square inches, brake lining is molded and the approximate weight of each model, including adapter group, is 550 pounds.

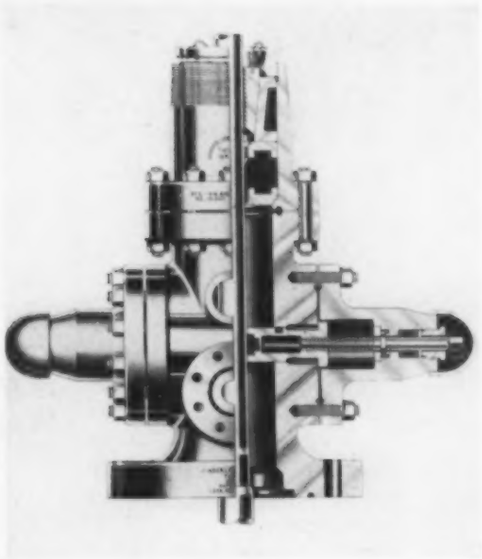
Valve for Controlling Pressure Well

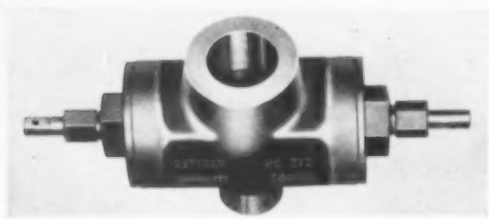
THE Hinderliter Patented Dual Valve Well Pressure Control with valve suspending segments was designed for use in the process of running or pulling well tubing or well casing against well pressures, or setting liners, setting screens, running or setting packers, coring under varied conditions, drilling-in under the pressure method, re-setting tubing as well as re-entering the well subsequent to completion, particularly where two producing horizons are encountered, without killing the well by mud or water, and without the necessity of employing special operators.

Adaptable for use with Christmas tree hook-ups of any design, drilling through valves or gate valves, etc., either flange or screw types.

When used in combination with the Hinderliter Three-In-One Casing Head Hook-up (as shown in this illustration, which provides a means of safe control) this device is applied to use in the operations tnumerated above and it is now possible to maintain a definite control of processing of the well tubing, well casing or drill pipe, or the various stages of completion operations as well as to provide an automatic means of sealing in the annular space between the well tubing, drill pipe, or casing which has been set.

The control valve is made by the Hinderliter Tool Company, a division of H. K. Porter & Company.



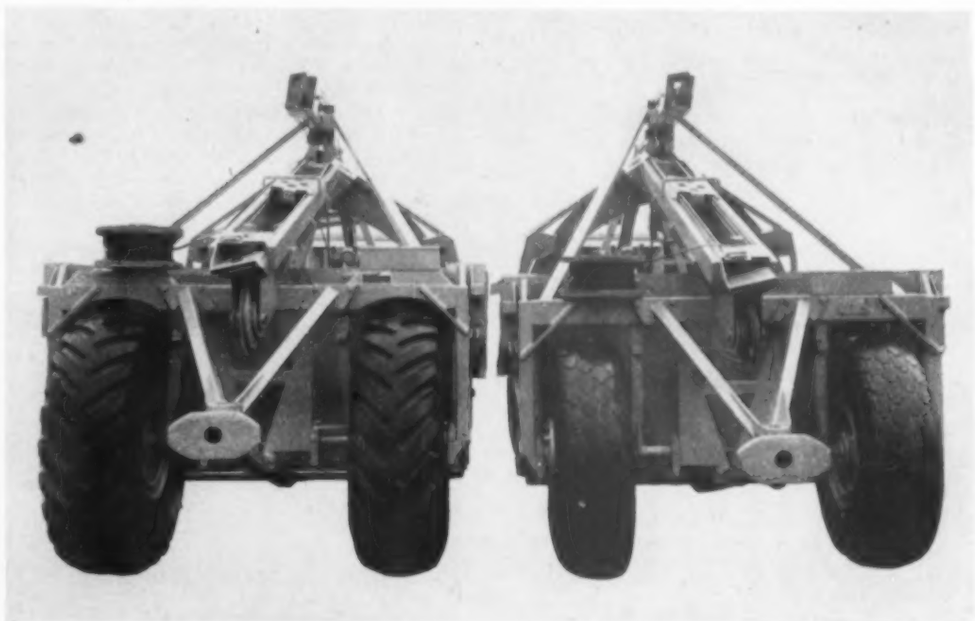


Improved Blowout Preventer

A NEW, improved blowout preventer (No. 212) that permits changing rubbers more rapidly, and also can be used for swabbing or running rods in wells that head, or flow, in the course of operations, has been announced by J. P. Ratigan.

The No. 212 blowout preventer is manufactured of high-pressure electric steel. It weighs 41 pounds, has a capacity of 3,000 pounds, and is regularly equipped with Ratigan's new type retractable rubbers. To change rubbers it is only necessary to unscrew the plug at each end.

The No. 212 is manufactured in two sizes. The 2½" size is supplied both plain and upset. The 2½" plain can be furnished in double female, but if male and female are required, a short nipple can be used to accomplish this. The 2½" upset can be made in male and female or double female. The 3" size is supplied male and female only; however, the male connection easily can be converted to female by installing a 3" collar, thus making a double-female unit.



New Standard LeTourneau Unit

LATEST construction equipment development to be announced by R. G. LeTourneau, is the equipping of its Tournapull-drawn LP Carryall Scrapers with 21.00x24 tires instead of 18.00x24 tires used because the scarcity of rubber and other wartime conditions.

While the former size was considered adequate, use of the new larger tire has resulted in many added advantages. Maximum loads can now be transported with lower pressure in the tires. For, although the increased load capacity of the tires does not affect the gross load carried by the Tournapull-Scraper unit, it does materially affect the performance in off-the-road operation. With lower pressure in the tires, flotation is increased and rolling resistance reduced, resulting in better and faster loading, hauling and spreading. Flotation contact area of the new tires is 24% greater than the old—373 sq. in. as compared to 300 sq. in., at rated pressures of 40 and 50 lbs. respectively.

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Rotary Releasing Spear

THE Bowen Rotary Releasing Spear, which has been used for all general purpose spear work such as pulling and backing off stuck casing, drill pipe and tubing, removing liners, and for holding casing, is now equipped with a new type of slip known as the Du-All, recently developed by S. R. Bowen Company. The purpose of this new slip is to eliminate need for the three separate types of slips usually required to properly equip the spear for various operations.

Formerly, it has been general practice to furnish three different types of slips with the Bowen spear for the various types of jobs: pulling slips, having horizontal wickers for gripping the fish when upward pull is exerted, backing-off slips with vertical wickers for gripping the fish when left hand torque is applied, and holding slips with vertical wickers that grip the fish when right hand torque is exerted. Now, however, the Bowen releasing spear is furnished with the new Du-All type of slip which can be used for pulling, backing off or holding, entirely eliminating the need for a separate set of slips for each job, saving time and greatly simplifying fishing operations.

Construction of the Du-All Slip is shown in the accompanying illustration. It consists simply of the usual number of horizontal wickers for pulling but, in addition, each slip in the set has one vertical wicker for backing off and one vertical wicker for holding. This makes it possible to run in the hole with the Du-All slips on the Bowen spear and perform any type of spear operation required without coming out of the hole for slip changes. Field tests have demonstrated that there is no loss of pulling ability, and that there is ample engagement for all types of backing off and holding jobs on both left and right hand operations.

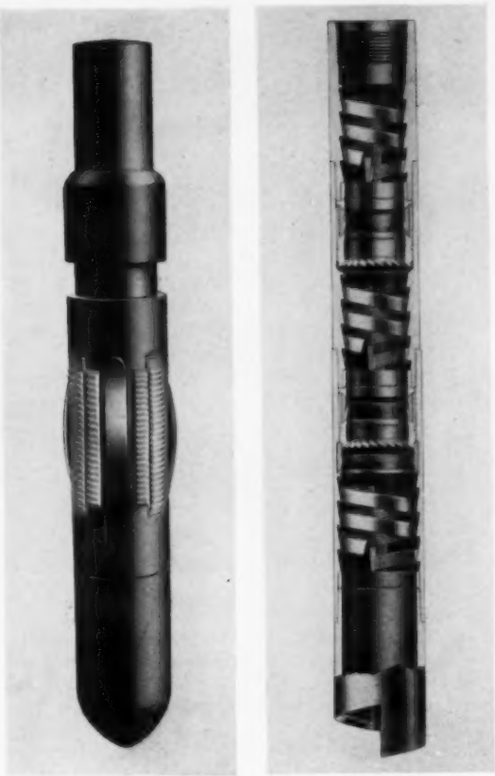
The new Du-All slips will be furnished as standard equipment on all Bowen Rotary releasing spears, thus enabling the operator to simplify his equipment needs.

New Overshot for External Upset Drill Pipe

INCREASED use of externally upset drill pipe has made it essential that a tool be specially developed for catching pipe of this type when a fishing job is encountered. The Series 350 Bowen Overshot recently announced by S. R. Bowen Company meets this need by providing a tool that will catch and pack off pipe, pipe upset or tool joint without making any changes or adjustments.

Assembled as a three bowl tool, the Series 350 incorporates grapples and pack-off rubbers for the three sizes, milling members for pipe and upset, and a guide for centering the fish in the tool. The manner in which these grapples are assembled in the bowls enables the standard overshots to have exceptionally small outside diameters without sacrificing wall strength. This same feature also permits construction of special Bowen overshots to meet tight hole conditions that would ordinarily eliminate outside releasing fishing tools. For example, one special Series 350 with an O.D. of only $5\frac{3}{4}$" catches and packs off $3\frac{1}{2}$" drill pipe, 3-13/16" O.D. external upset and $4\frac{3}{4}$" O.D. tool joints.

An important feature of the Series 350 Overshot is that it both sets and releases on right hand rotation,



New Bowen Releasing Spear and Overshot

thus avoiding the dangers of having to turn the string in an unscrewing direction. Right hand rotation of the string expands the grapples as the tool is simultaneously lowered over the fish, and simply allowing the rotation to stop causes the grapple to take hold around the fish. Thereafter, when upward pull is exerted the hold is secure, since the Bowen overshot takes hold as soon as it is over the fish. The Series 350 Bowen overshot is made in a full range of sizes in both right and left hand assemblies and is available with undersize grapples and rubbers to catch worn tool joints.

Drilling by Electric Power

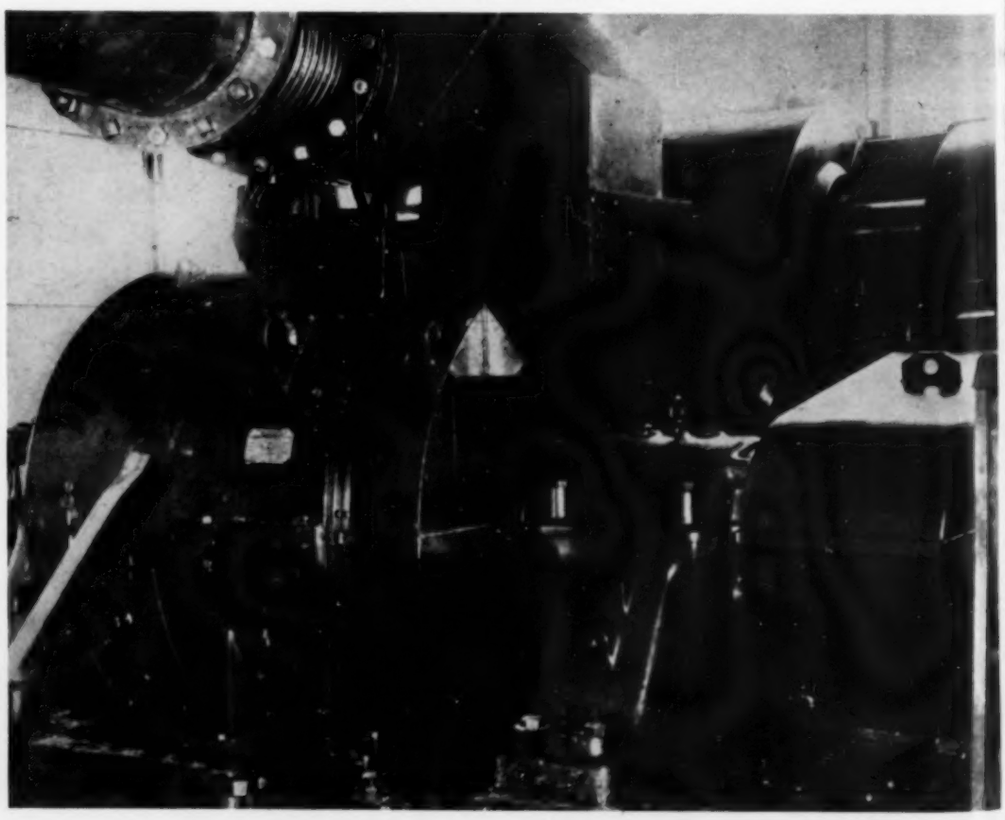
THE Westinghouse Electric Corporation is offering a complete power plant mounted on a trailer ready to be hauled to a new location and there made ready for operation in a very short time. This power plant consists of 4 — 60 Kw, 1200 RPM oil well drilling generators, each with an overhung 5 Kw auxiliary generator.

Space at the driller's station is very limited, yet he must have convenient easy control of all operations. To achieve this Westinghouse has developed a master controller, compact assembly of four oil immersed controllers, motor field resistors, oil immersed panel board with terminal board, and a junction box.

The four controllers are operated by handwheels at the driller's station, being connected to the wheels by concentric shafting. Four operations may be carried on simultaneously, being at easy "finger tip" control of the driller, and with independent speed control. All power may be quickly concentrated on the drawworks motor for hoisting by the driller who has complete control. The driller may quickly concentrate all power on the drawworks motor for hoisting, and have complete control by means of a single handwheel. All control connections are made by inserting two 19-point receptacles into the bottom of the junction box. The oil immersed panelboard affords control of all auxiliary motors — blower, bug fan, shale shaker, etc. — and lights, on or near the derrick floor. This unit is mounted on the derrick floor to the rear of the drawworks.

Drawworks motors on electric drilling rigs have been, in the past, coupled to drilling gears which in turn carried overhung chain drives to the drawworks. Now motors have been designed and built to carry the overhung chain drive for direct drive to the drawworks.

800 HP Electric Drawworks Motor



he drilling gear is eliminated, reducing the number f pieces of equipment.

he photograph illustrates an 800 HP, 600 RPM rawworks motor, with only two bearings, with an verhung drive consisting of double quad chains. This otor has a shaft extension on both ends, either one apable of carrying the drawworks drive, the second eing available for a core reel drive. The motor is entilated by means of a blower unit mounted on top f the main motor. This blower unit, with explosion roof motor, supplies full measure of "safe" air to e motor at all times.

he motor is mounted on a rigid, skid type, oil field ase, and is shown on location in the Houston area, n a rig of the Rowan Drilling Company.

B. J. Power Slips

ew Power Slips

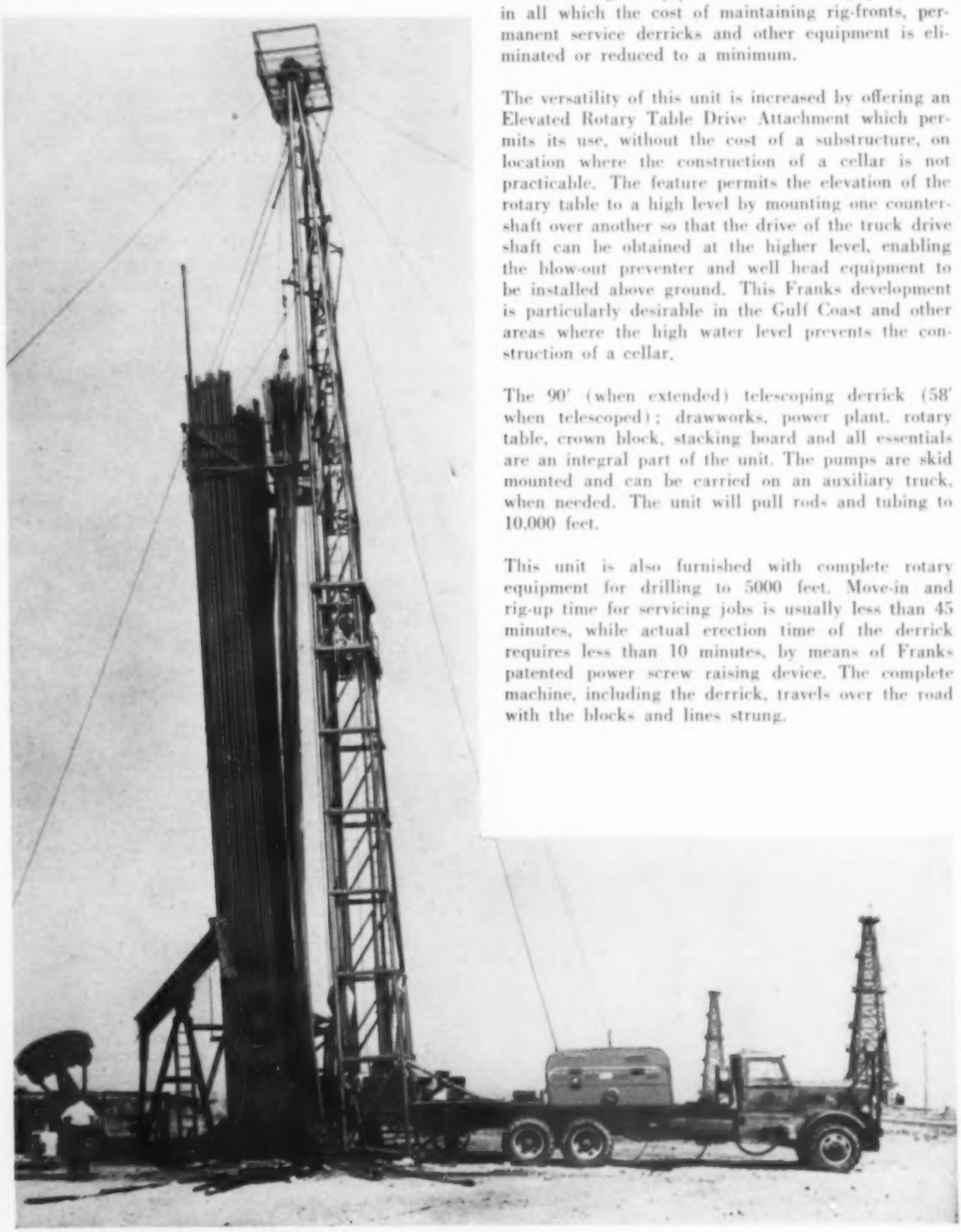
THE BYRON-JACKSON COMPANY have completed e development and testing of their B. J. Power Slips d now have them in production. The manufacturers mphasize that their new product largely eliminates e last hard manual labor job on a derrick floor, nd marks a considerable forward step for greater afety in drilling an oil well.

he main elements of this mechanism consist of five arts: (1) The cylinders used to raise, lower, or hold e slips in position. (2) An arm or main body exnding from the cylinder heads and supporting the ip ring. (3) The slip ring which is free to revolve ithin the body and supports the triple segment slips. 4) Two master bushing ring plate segments which rve to guide the slips into the master bushing, and 5) A dual position, four-way control valve, located the driller's post.

operation, when coming out of the hole, the pipe simply picked up high enough to clear the Kelly b. The BJ master bushing rings are inserted and e unit positioned over the table in the following manr: Power is admitted to the cylinder and the slip echanism is picked up from out-of-service position clear the rotary table. The cat line is then hooked to the eye bolts provided on either side of the arm, d the body opened at one of the two hinging points, ter making sure that the slip ring and the carrying m segments are locked together. The latch is opened d the body raised and swung into proper position and lowered around pipe (the illustration shows the slips raised). Maximum opening provides ample clearance around the pipe. The body is closed and the chained hinge pins are reinserted, placing the slips in a working position. Slips are then set by means of the control valve at the driller's post. Weight of the pipe is then assumed by the power slips and the joint can be broken. When the next stand of pipe is ready to be pulled, the pressure is admitted to the cylinder by the control valve and the slips rise to standing position as the pipe is pulled.

When going in the hole the slips are brought to standing position. Bit and drill collars are lowered directly through the 16″ opening in the slip ring until the elevator approaches the slip mechanism, at which time the control is actuated by the driller, and the slips are set.

The power slips are so designed that any normal size drill pipe, tool joint, or pipe protector can be easily accommodated through the slip ring. The full opening of both slip ring and slips provides for safe handling of casing up to 7″ OD without slowing down regular practice.



All-Service Telescoper Unit

AN "All-Service" unit of advanced design, Franks Improved Mode 7000 Telescoper is a self-propelled, power take-off, double or single drum winch unit equipped with a 90′, 200,000 lbs. capacity, tubular telescoping derrick. This unit, composed of winch, truck and derrick, is adaptable to all servicing jobs on wells which are without derrirks. It is so designed, however, that the derrick may be disconnected, and left standing on one location, while the unit is moved elsewhere for operation on jobs where permanent or service derrick is already a part of the well equipment.

For clean-out work, drilling from the grass roots, drilling in, and deepening, the unit is offered with a Franks' propeller shaft rotary drive attachment, or a rear-end rotary countershaft, or both.

Franks' Spudder Attachment affords a variety of uses, for cleaning out and drilling, following up rotary outfits, drilling in and testing oil sands, jarring out liners, fishing for pipe and tools, taking potentials, in all which the cost of maintaining rig-fronts, permanent service derricks and other equipment is eliminated or reduced to a minimum.

The versatility of this unit is increased by offering an Elevated Rotary Table Drive Attachment which permits its use, without the cost of a substructure, on location where the construction of a cellar is not practicable. The feature permits the elevation of the rotary table to a high level by mounting one countershaft over another so that the drive of the truck drive shaft can be obtained at the higher level, enabling the blow-out preventer and well head equipment to be installed above ground. This Franks development is particularly desirable in the Gulf Coast and other areas where the high water level prevents the construction of a cellar.

The 90′ (when extended) telescoping derrick (58′ when telescoped); drawworks, power plant, rotary table, crown block, stacking board and all essentials are an integral part of the unit. The pumps are skid mounted and can be carried on an auxiliary truck, when needed. The unit will pull rods and tubing to 10,000 feet.

This unit is also furnished with complete rotary equipment for drilling to 5000 feet. Move-in and rig-up time for servicing jobs is usually less than 45 minutes, while actual erection time of the derrick requires less than 10 minutes, by means of Franks patented power screw raising device. The complete machine, including the derrick, travels over the road with the blocks and lines strung.

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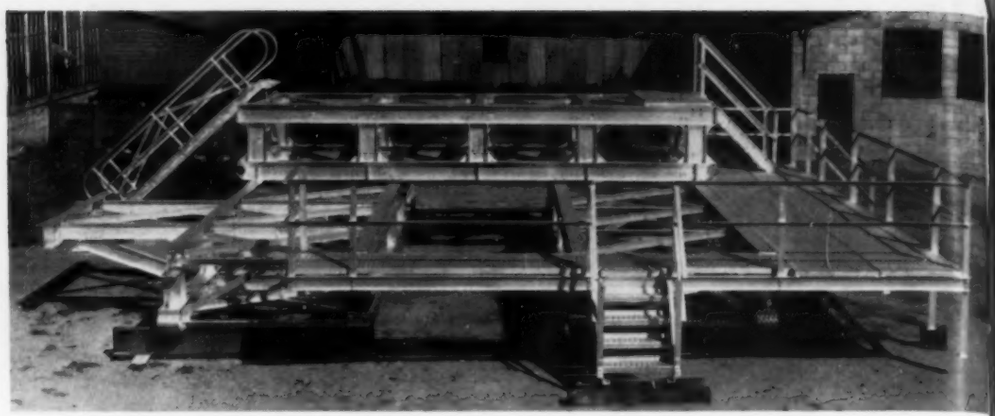
Adjustable Stairways for Drilling Rigs

ADJUSTABLE stairways, made by Lee C. Moore Co., Inc., are designed to contribute to the efficiency and safety of any drilling rig with either standard derrick or portable mast. They are also adaptable to refinery and field tank installations.

These stairs are adjustable simply by swinging to the required height, within their range. The treads are one piece 2' 6" wide and 11" deep, and are formed from heavy safety tread, self-draining punched plate. The front edges are turned down and the rear edges turned up. Their generous width places the back edge of one tread well behind the front edge of the next higher tread for gretaer safety.

The safety handrails are of formed pipe with welded bracing and are designed to add rigidity to the complete assembly. They are easily and quickly installed.

The two flight adjustable stairway unit has a landing platform formed from heavy, safety tread, self-draining punched plate flooring, and the area across the platform between the two stairs is protected by a removable safety handrail. The single unit is available in seven different sizes and the two flight unit is available in two sizes.



Adjustable Stairways Promote Safety on the Drilling Rig.

Hydromatic Brake Assembly

FOR drilling at depths in excess of 5,000 feet with 4½-inch drill pipe, a heat absorbing brake of the hydromatic type is essential because of the inherent limitations of all manually-operated friction brakes. In order to keep the U-15 rotary drilling unit's dependable friction brakes within the temperature range most conducive to efficient operation and long service, Unit Rig engineers have developed a Hydromatic Brake Assembly that is designed for the job.

In the past, draw works have utilized hydromatic brakes of large size (32" or larger) connected as an extension to the drum shaft. They are very satisfactory from an operating standpoint, but add a great deal of weight to the draw works, and increase its width to the extent that it is necessary to dismantle the brake to faciliate transportation.

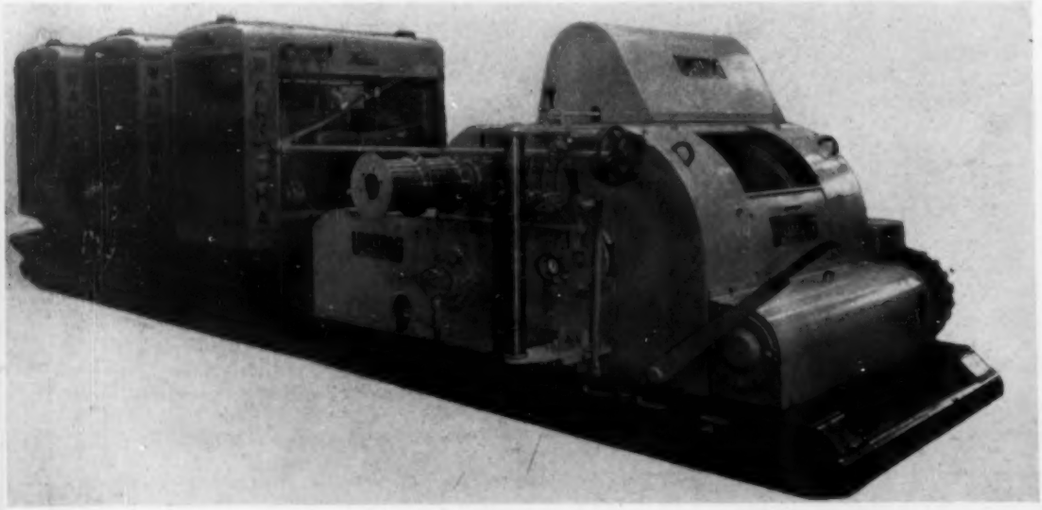
Unit Rig's Model U-15 introduces a new adaptation in the field of rotary drilling—the driving of a high speed hydromatic brake from the drum of the draw works by means of a clutched chain drive. A 15-inch Parkersburg double hydromatic brake is mounted on top of the draw works case and, although some weight is added to the unit, the portability is not affected as the overall width is not increased.

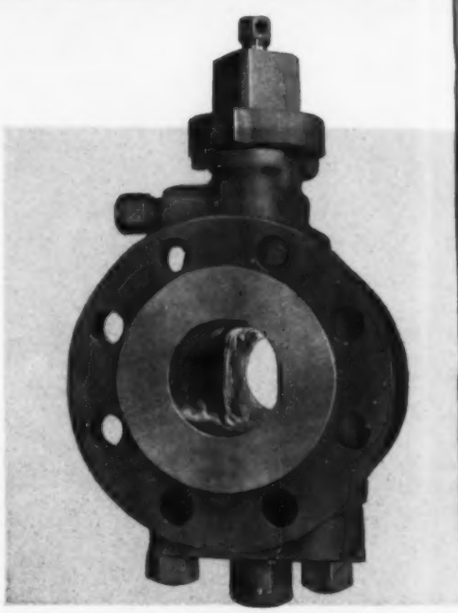
Driven from the drum of the draw works, the Unit Rig Hydromatic Brake Assembly has better operating characteristics than the direct-coupled hydromatic brakes. It offers very slight resistance as the load starts to fall, but, as the block speed accelerates in falling, the brake absorbs braking energy at a rapidly-increased rate (approximately proportional to the cube of the velocity) thus acting as an excellent governor of the drum speed.

Drillers appreciate the fact that there is so little to do in the way of controlling the Hydromatic Brake Assembly on the U-15. It serves as its own pump and the rate of fall of the block can be controlled by a simple adjustment of a valve in the inlet water line. Drillers have repeatedly mentioned that there is no appreciable drag in elevating the blocks when using this brake. With the larger, direct-coupled brakes, it is necessary either to declutch the brake or be content with a heavy drag when raising the load.

Repeated performance shows that the brake flanges absorb so little of the energy that they remain cool to the touch even at depths in excess of 6,000 feet with 4½-inch drill pipe. The brake assembly is equipped with a jaw clutch so that the brake may be disengaged when coming out of the hole or when its use is not repaired.

The Hydromatic Brake Assembly is interchangeable between rigs as it can be removed from the draw works case and is equipped with its own skids.





Non-Corroding Valves

TO avoid the costly use of corrosion-resistant alloy for the entire construction of a lubricated valve, yet provide full interior surface protection, the Nordstrom Valve Company has developed methods for the application of corrosion and abrasion-resistant alloys to the seating faces and other exposed inside surfaces.

Nordstrom's Merchrome coating and weldlined methods have been found applicable to various classes of steel ordinarily used in valve construction, including carbon steel, 5% chromium steel, etc. The composite construction offers several advantages in many types of refinery and chemical services. From the viewpoint of availability "weldlined" construction is particularly advantageous in larger sizes.

A special example of the application of "weldlined" construction is found in some oil fields where not only high pressures, but severe corrosion has been encountered in the material flowing from the well. For this combination of conditions, Nordstrom is building 3000-pound and 5000-pound "Hypreseal" valves provided with stainless steel throat lining and with hard surfacing on the body and plug seats. In this case the valves are all of the round opening type, which permits the use of throat linings in the form of stainless steel tubes. The tubular lining is welded to the hard facing at the intersection with the tapered seat and attached to the end flanges by a weld made by stainless rod. The welded material extends across the flange and faces to include the surface of the gasket seat or the ring groove. In this case, valve bodies are made of high-strength alloy steel, and the combination lining not only provides full corrosion resistance but the hard surfacing of the tapered seat also promotes smooth valve action under extreme pressure loads as well as resistance to abrasion.

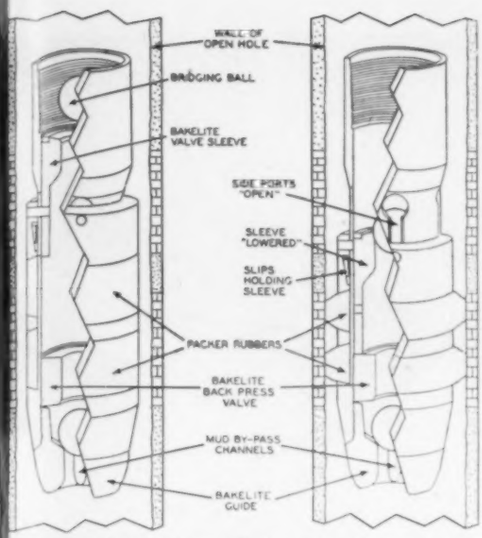


Fig. 1—Isometric drawings of the new full hole-type packer shoe, in running position (left) and (right) in position and set, ready for cementing operation

Larkin "Cementrol" Equipment

THE Larkin Packer Company have originated a cementing method which is designed to provide a means of overcoming well completion difficulties caused by intrusion of cement into the open oil and gas-bearing formation below the casing seat. The operator is thus enabled to drill the hole into the producing formation and still keep it clean.

The construction and operation of the Larkin "Cementrol" shoe are indicated in the accompanying drawings; this shoe serves as a conventional float shoe while casing is being run. Until the packer has been set no side ports are open and all circulation must therefore pass through the bottom port.

When casing has been landed at cementing depth a Bakelite bridging ball is dropped and is pumped down slowly until it comes to rest on the seat of the internal Bakelite sleeve valve, which is closed over four key-hole shaped ports in the shoe body. This internal sleeve valve is connected to shear pins which extend through the ports. The external sleeve is in contact with the packing elements.

After the bridging ball has been seated pump pressure is continued and the resulting downward movement of the internal sleeve valve is transmitted to the external sleeve by means of the shear pins which connect the two. The downward movement of the external sleeve exerts a force on the packing elements and expands them against the wall of the hole. Full expansion of the packing elements can be obtained with pump pressure not exceeding 300 psi. When the shear pins reach the limit of their travel within the key-hole slots or when the packing elements have reached the limit of their expansion, pressure is built up further, and at a pressure between 800 psi and 900 psi, the four pins will shear and allow the internal sleeve valve to move downward independently of the external sleeve and thereby open the side ports. After the pins shear and the ports open, pressure should drop off to normal circulating pressure or less. Slips lock the external sleeve in place and the packing elements are held expanded against the wall of the hole, thus locking any downward movement of the cement outside the casing. The Bakelite bridging ball and internal sleeve valve block the downward passage of cement within the casing and a rubber gasket makes the seal fluid tight. The casing is then cemented through the exposed side ports and there is no place for the cement to go except up.

Expansion of the packing elements centers the casing at the shoe or collar and the cement is distributed evenly around the casing through the side ports. These two factors provide ideal conditions for a successful cement job.

Magnesium Pipe Line Protection

THE Dow Chemical Company, which during World War II, produced immense quantities of metallic magnesium for military purposes, is now making large quantities available to the oil industry for the cathodic protection of pipe lines against corrosion. Magnesium has exceptional advantages as a galvanic anode, as it combines in one metal a large storage capacity for electricity and a high potential or driving voltage. When properly installed, as much as 600 or more ampere-hours of electricity may be realized from each pound of magnesium consumed at the amode. With the consumption of 1/10th ampere as is normally the case on pipe line installations, the life of a 17-pound magnesium anode is estimated at about 10 years.

At a Texas plant where corrosion conditions are unusually severe, magnesium protection has been installed on some 150 miles of eight-inch and four and one-half-inch gas line radiating out into the surrounding countryside. The installations in this case have all been made on coated pipe, and here it has been found that anodes may be placed as much as three to six miles apart and yet obtain a satisfactory degree of protection over the entire line. In one instance 20 miles of eight-inch pipe was protected with a total of 45 magnesium anodes distributed over four installation site or stations.

In a swampy Michigan location lines of bore 6-inch and 10-inch pipe are similarly protected. Both electrical measurements and leak records show that the protection is highly effective.

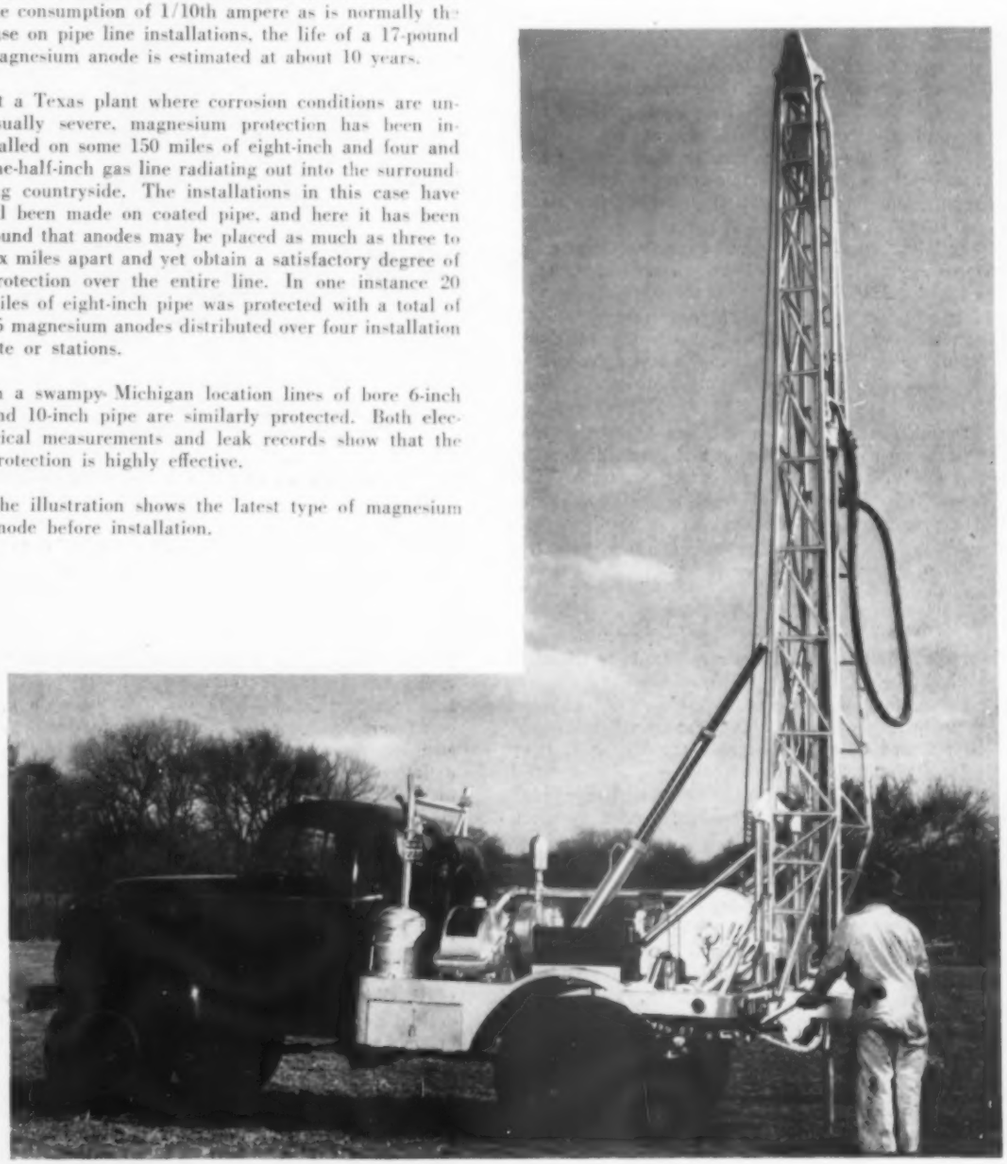
The illustration shows the latest type of magnesium anode before installation.

Improved Truck-Mounted Rotary Drill

THE new model M-6 rotary drilling unit of the Engineering Laboratories, Inc. has received some marked improvements which make it still more suitable for drilling all types of shot hole, coring to 1000", and to water-well drilling. Throttle, gear shift, brakes and controls are grouped within convenient reach of the driller. The chain pulldown offers rapid application of pressure to the drill bit. The hydraulic mast lift gives ease in raising and lowering the mast and assures safety since the mast cannot fall. Rotary table speeds cover a wide range in sixteen speed selections. The large water course of the new type swivel, tool joints and pump discharge hose, allows greater water volume with less pump pressure, and therefore, more power for other purposes. Two winch drums give speed and flexibility to operations. The mast height allows pulling two joints of pipe at a time for rapid "round trips" and allows easy handling of casing.

Standard, readily available parts are used everywhere possible.

Proper distribution of weight allows this unit to operate in all types of terrain. Roadability is excellent. The slow speed main shaft is mounted from the top of the drill frame and gives easy access to all parts. Drive chains are enclosed to exclude dirt and sand. This drill mounts on a standard 1½-ton truck chassis.



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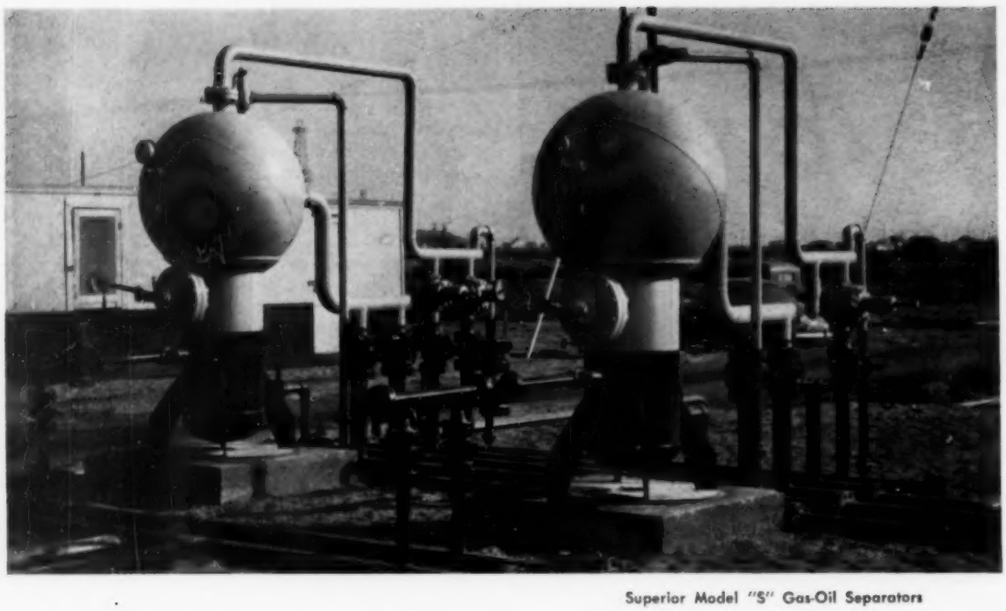


Superior Model "S" Gas-Oil Separators

Gas-Oil Separators

THE Superior Tank & Construction Company's Model "S" Gas-Oil Separator includes some new features for the separation of gases from oil, for the collection of the oil and for the return of separated fluids to the main oil body. The spherical top portion of the separators (see the picture) provides changing conditions of area and velocity where these are important whereas the small cylindrical bottom portion serves where volume and velocity are of no particular importance.

The inlet, being at the point of greatest diameter, affords a wide flashing area for primary separation of oil and entrained gases so that most of the liquids drop out. As the flow of gas converges toward the scrubbing vanes, velocity is accelerated with the diminishing diameter and final and complete separation occurs in the assembly of separating baffles.

The lower half of the spherical shell provides an ideal descending surface for the oil and a retarding action through spreading the oil over a wide surface in a thin sheet. This permits better escape for entrained gases. The cylindrical bottom reservoir is conventional with baffle protection for a float ball and sufficient depth to provide a suitable fluid seal between the gas area and the oil outlet.

There is also a new automatic jetting arrangement for recycling and returning separated fluids to the main oil body. It is well known that the baffles and vanes in all separators offer some resistance to gas passage and thus pressure losses occur. Since separated fluids must be returned to the oil body in the higher pressure area of the tank, it is obvious that such liquids must flow from a region of low pressure to one of high pressure. This means that the liquids must, in effect, "run up hill."

The new jetting arrangement overcomes this fault and provides for the release of dry gas at all volumes up to rated capacity. This is of particular importance in heading flows where large surges may quickly accelerate the fluids passing through the separator.

At the present time Superior Model "S" Separators are being produced for service at pressures to 125, 250 and 500 pounds per square inch and carry API-ASME Code labels for their respective working pressures. The units are light in weight and compact, being constructed with a 40" diameter sphere and having an overall height of less than 7'6".

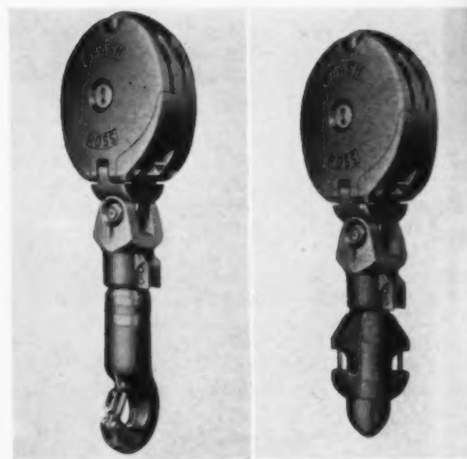
Mud Gun Platform and Assembly

PATTERSON-BALLAGH'S latest contribution to the Mud handling problem is the Patterson-Ballagh Mud Gun Platform and Assembly. Designed as a support for Patterson-Ballagh mud guns, this new item has been readily accepted by operators who heretofore have had to resort to makeshift or expensive arrangements for the support of mud guns. The platform can be moved from job to job. The holes in each corner are used for fastening the base down. The complete assembly shown in photo above consists of a Patterson-Ballagh mud gun, in this case the Muddler, the platform and the counterweight (also an accessory) shown on the handle. The platform or base is quickly connected to the mud line and the Mud Gun by hammer unions. Patterson-Ballagh's other mud guns, codes Mufti and Midlean are interchangeable with the Muddler in this assembly. High pressure valve shown in photo is not part of assembly.

The counterweight is a 25-pound cast iron weight which slides on the handle and can be locked in any desired position. Its purpose is to act as a counter balance where an extra length of discharge pipe has been added.

The assembly may be purchased as a complete unit, or the mud gun, platform and counterweight are available separately.

Open Position of Unitized Block.



Unitized Blocks with Hook Connector and Link Adapter Connector

New Quick-Opening Unitized Block

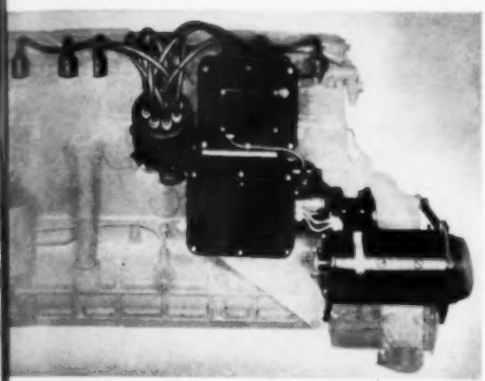
THE unitized blocks of the Baash-Ross Tool Co. have many advantages on portable rig operations, production jobs and similar work. These blocks combine — in *one* compact unit — both a traveling block and a free-swiveling hook or link adapter connector, thus eliminating the space usually wasted by bails between these two units and providing an unusually compact and convenient block assembly.

Through development of the new DBH unitized block another unique convenience has been incorporated into this equipment. The DBH block is so designed that you simply pull one pin and the entire block opens to apply the lines in the sheaves. Just lay in the lines close the block, replace the pin — and the block is ready for use.

This new hinged construction simplifies all types of rigging-up operations. On rig-to-rig production work the operator can leave the lines hanging in the derrick between jobs. When production work is necessary the crew simply lays the loops into the block, closes it and they are ready to work in a fraction of the

time ordinarily required for reeving the line. It not only saves time and work, but is also a definite safety advantage because there is no need for risky crown operations to reeve the lines. The Baash-Ross DBH unitized block is available with either a built-in hook connection or with a built-in adapted for holding the elevator links. By using the link adapter and a Baash-Ross swivel bail adapter on the swivel, the operator can run pipe and support the drill string with the same elevator assembly, thus simplifying operations and saving valuable derrick space.

In addition to the two basic types of connectors, DBH unitized blocks are available with 1, 2, 3 or 4 sheaves in a wide range of sheave diameters and with load ratings from 30 to 150 tons. On all units the free-swiveling hook or link adapter can be quickly locked in any one of eight equally-spaced positions whenever desired.



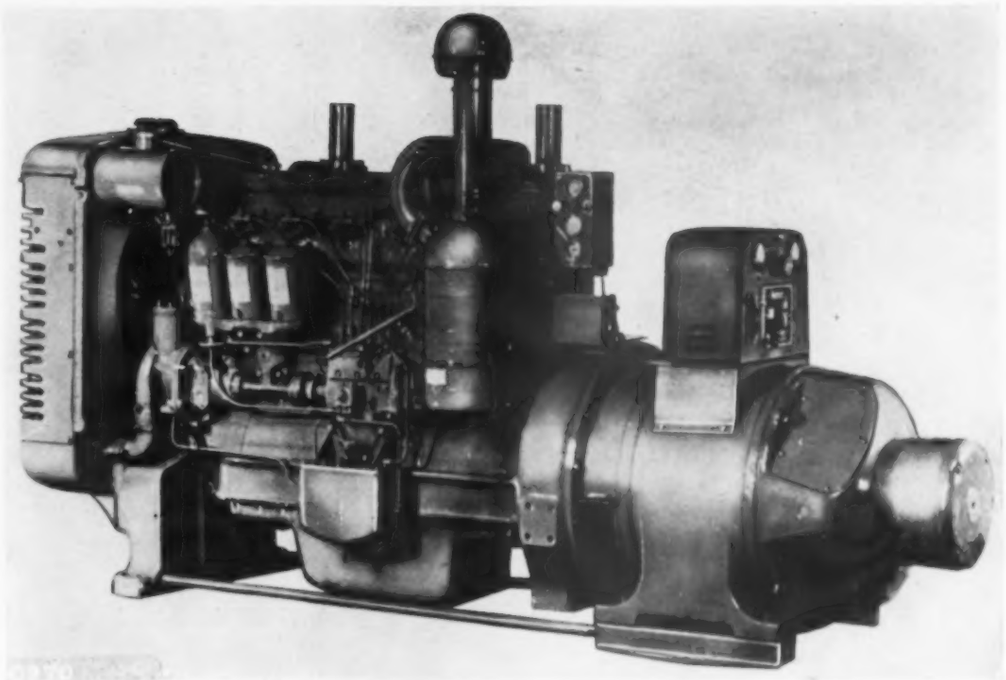
Anti-Explosion Ignition Shielding

USED extensively throughout World War II on all types of motorized combat equipment on land and sea and in the air, Hallett Filtered Ignition Shielding is now ready to supply an urgent peacetime need of long standing in the petroleum industry.

By completely housing and shielding the entire ignition system on internal combustion engines used in oil field drilling and pumping operations, this precision-engineered equipment prevents sparks or high-frequency leakage from distributors, magnetos, spark plugs, coils, wires,generator terminals, and voltage regulators, thus eliminating the possibility of explosions and fires.

Hallett Shielding moisture-proofs and protects the ignition system itself against water, oil, corrosion and other damage, assuring unfailing power supply, full engine power and peak engine performance at all times.

Hallett Filtered Ignition Shielding is available in "packaged" kits for practically all types of engines—complete assembled units, ready to install and use. The normal shielding package for gasoline engines consists of a distributor shield which completely houses the distributor; a spark plug shield for housing the spark plugs; flexible metal covering for housing the high tension wire from distributor to spark plug; a metallic coil shield which houses the ignition coil; a shielded primary lead from distributor to coil; a vent tube from distributor shield to inlet side of carburetor, for distributor shield ventilation, eliminating ozone corrosion in the distributor; a generator terminal shield with connected shielded leads to voltage regulator shield; and all necessary brackets, special screws, and other supplies and instructions. The outfit is made by Hallett Manufacturing Co.



Diesel-Powered AC Generator Set

FOR the smaller power installations, The Ready-Power Company have a series of combination units rated from 11 to 50 K.W. Their model RD-18A, shown in the illustration, is an International Harvester UD-18 full Diesel engine close coupled to a 50 KW AC revolving field generator with a direct connected 12 volt electric exciter. It starts and warms up on gasoline. The manufacturers recommend it as a compact, economical long-lived engine generator that produces over 65 KW at peak load, carries 62.5 KW safely for two hours, or 50 KW continuously.

Mud Preservatives

TO meet the demand for a method of producing Impermex muds stabilized against microbiological degradation without resorting to high pH. Baroid Sales Division has developed two closely related chemical preservatives which dispense with all other forms of preservation. Impermex Preservative No. 5 and Impermex Preservative No. 6 may be added to the mud dry, in the same manner that Aquagel or Anhydrox is added, or they may be made into a suspension with water in a treating barrel, added in the same manner that Stabilite is added. Recommended initial treatment of the mud is 1 lb. of Preservative per barrel of mud. A preservative test kit is available, which enables a daily check to be made of the amount of Preservative present in the mud, so that proper make-up quantities can be added from day to day, thus maintaining optimum preserving conditions without the use of unnecessary excesses.

Impermex Preservativve No. 5 is recommended for general use, but in some areas Impermex Preservative No. 6 is also usable. A Baroid field engineer should be consulted for specific recommendations. Impermex Preservative No. 5 has found considerable employment in connection with salt muds where it is difficult to maintain a condition of saturation. When the preservative is used, the salt content is a matter of no importance, and fresh water muds can be preserved as well as salt muds. The preservatives are not recommended as an adjunct to high pH muds.

Weight Indicators

Martin-Decker Corporation has developed a line of Clipper Sealtite Weight Indicators for use with jackknife, portable or mast rigs or for conventional derricks having restricted floor space. They are available with or without recorders, tachometers, mud pump and vacuum gauges. Installation at the driller's position protects the gauge mechanism from the terrific whip and damaging vibration occasioned by deadline mounting. Permanent sealing at the factory eliminates refilling and enables the instrument to remain connected even during transportation and storage. Special non-freezing, non-corrosive weight indicator fluid provides temperature compensation, insuring highest accuracy under all climatic conditions.

Long Life Balls and Seats

A NEW abrasion and corrosion resistant alloy called Tantung has been introduced to the oil industry in the form of pump balls and seats. This material also is non-magnetic and practically unbreakable. Laboratory and field tests, which are still running, have been made in especially selected areas having the maximum problems presented by abrasion, corrosion, magnetism and breakage.

Tantung is a hard, tough, wear-resistant alloy containing Tantalum-Columbium Carbides. This alloy was originally developed as a cutting tool material. Its peculiar self lubricating quality greatly resists abrasive wear and impact, caused by the pounding action found in pumping.

Tantung balls and seats are cast to shape and then finish-ground to American Petroleum Institute specifications. Their hardness is obtained in the cast form and the elimination of hardening operations minimizes internal stresses and strains. These Tantung balls and seats in all standard sizes are made by Jadon Equipment Company.

PRINT IN BINDING

New Catheads

GEMCO OIL TOOLS, INC. has recently developed a complete line of new and improved breakout and spinning catheads. The line consists of a super automatic positive clutch type breakout cathead, a plain automatic positive clutch type breakout cathead and a (3 in 1) friction clutch type breakout, spinning and combination make-&-break cathead and many scientific engineering developments offered to the industry for the first time.

Each of the three different types is built around a common base assembly consisting of shaft adapter for adapting to any size or type lineshaft, adapter retainer, roller bearings and spool. On this base assembly may be mounted any one of the different cathead units, thus permitting complete interchangeability of all types. The base assembly is also a complete unit within itself and may be used independently without the cathead unit when doing work requiring only a spool.

Installation has been simplified by the use of a standard anchor for all models. The anchor also serves as a mounting for optional hydraulic, pneumatic, steam or mechanical operating control. The cathead may be removed from line shaft without disturbing either the anchor or operating controls.

The 3 in 1 friction clutch type may be mounted and will operate with equal efficiency on either side of the drawworks, and when mounted may be changed from breakout to spinner or vice versa by changing only the line. It employs an internal expanding friction clutch that requires no adjustments, thrust bearings or toggles.

The super automatic positive clutch type is now vastly improved to insure smoother operation, greater safety and lower maintenance cost. The safety jerkline shoe can now be removed from the grooved drum and replaced without the aid of tools. A ratchet type operating mechanism prevents repeat operations even though the operating lever is not released by the operator. No accidental engagement or disengagement is possible.

The plain automatic is designed to fill a need for a low cost utility unit. It has the lowest jerkline speed of any cathead of this type. The shoe is disengaged by a cam from underneath that forces the shoe upward, thus eliminating heavy impacts. The shoe is locked in disengaging position when not in use. All models are fully interchangeable, and may be changed from one shaft to another.

Slush Pump Designed for 15,000 ft. wells.

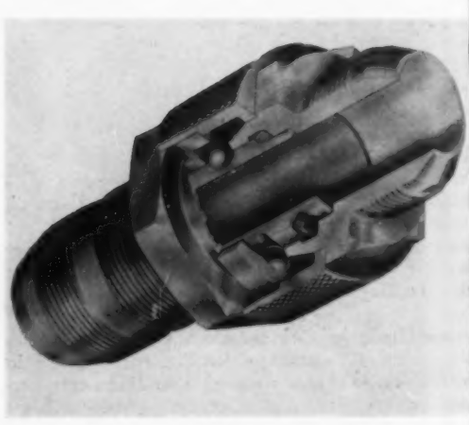
Powerful Slush Pump

ONE of the problems encountered in deep-well drilling is that of maintaining the velocity of the slush at sufficient rate to carry away the cuttings. The available slush pumps have been too small to keep up this rate of circulation, and the need for a big pump has long been realized. To meet this need Bethlehem Steel Co., Inc. have developed what it calls the G-600 pump to provide the necessary gear-end capacity to maintain high circulation rates without the necessity of compounding two pumps. Discharge pressure and volumes range from 2,910 psi. and 295 gpm., with the 5-in. liner, to 1,118 psi. and 767 gpm. with the $7\frac{3}{4}$-in. liner, at 75 rpm. and 600 hp. power input.

Incidentally, Bethlehem claims that this pump has the largest capacity of any power pump now in use by the oil industry. It is designed specifically for wells up to 15,000 ft. and on location in West Texas has shown itself thoroughly capable of carying the load involved.

The G-600 Power Pump is a $7\frac{3}{4}$ x 18 in. duplex, double-acting pump designed for versatility and flexibility in handling large quantities of drilling fluids at high pressures. It is the first pump of its kind built to weigh only 40,000 lbs. with such a large horsepower rating. Light weight and great strength have been made possible through the use of alloy-steel forgings and castings throughout.

An important feature of this big pump is the three-phase lubricating system which insures proper lubrication for each bearing surface and eliminates the possibility of mud or other foreign matter getting to the highly machined surfaces of the working parts. The gear and mating pinion are isolated from the rest of the pump, operating in an individual oil bath cast integral with the frame. Every roller bearing, including the crosshead pin bearing, is individually housed and pressure greased from conveniently located fittings.



New Pressure Coupling

A new Quick Coupling especially designed for use on hoses and lines operating under pressure has been announced by the Roylyn Mechanical Laboratory. Engineered for safety and simplicity, the new coupling is particularly adapted for hydraulic and pneumatic lines running from pressurized tanks such as truck and trailer connections, fuel lines, paint and insect sprayers and air-driven tool.

Based on the "inclined plane and wheel principle", the Roylyn coupling employs but three major parts: the cam ring, ball cage, and nipple. By rotating the cam collar steel balls are forced inward into a groove in the nipple forcing the halves together. The gasket retained in the ball cage provides a positive seal against dirt as well as being the separating spring force necessary to the operation of the lock. A slight shoulder on the cam assures a positive lock; application of more pressure tightens it, and only the cam collar can unlock it.

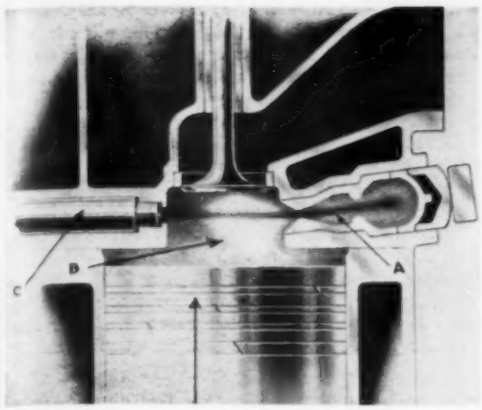


Fig. 1. Fuel Intake.

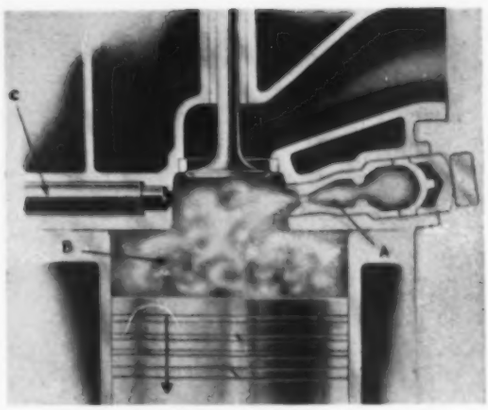


Fig. 2. Power Stroke.

New Kind of Diesel Engine

CONTINENTAL MOTORS CORP. have started production of a new line of industrial and transportation Diesel engines ranging from 25 to 150 horsepower. Additional models of higher horsepower will go into production in a few months.

The outstanding characteristic of the new Continental Diesels is in what the company describes as a "cushioned power" combustion chamber which causes delayed burning of the fuel and makes possible low working pressures on the cylinder. The combustion chamber itself is of the open type, and is relatively small, being confined to the area under the exhaust valve. This facilitates starting in cold weather, as the valve and chamber reach near-normal operating temperatures after only a few revolutions. All models start directly on Diesel fuel.

Directly off the combustion chamber and opposite the injection nozzle is a double air cell, which is described as a "Dyna-cell". Its operation is simple. The stream of fuel sprayed by the injection nozzle is relatively coarse —something more than 1/16 inch in diameter at its core, and fringing off into spray at the sides. The spray immediately ignites with the fuel in the open chamber, while the coarse portion of the stream is directed into the air cell on the far side of the chamber. See Fig. 1. As the burning occurs within the main combustion chamber, the pressure in that chamber rises and tends to flow into the air cells with the stream of coarse fuel directed there by the nozzle. While this is occurring the engine crankshaft is rotating and is moving the piston through the top of the compression stroke and starting downward on its power stroke. See Fig. 2.

The whole object of getting this quantity of fuel into the air cell is to effect a delay in the burning of all the fuel so the piston may have time to move downward and increase the volume in the cylinder in which the charge is to burn.

The fuel, having gone into the delaying air cell and having air pushed in with it from the start of the explosion in the main cylinder, starts to burn, and a portion of the fuel in the first air cell blows back into the main chamber while another portion of it blows on into the second air cell. The second phase of combustion thus occurs in the first air cell, where a portion of the fuel trapped in the cell is put back into the cylinder combustion to keep the pressures normal and constant. The remainder of the fuel has been forced back into the rear air cell, further delaying its admission to the main combustion chamber. The third and last phase of combustion occurs after the piston has had time to move downward appreciably in its stroke. At this point the fuel in the rear cell burns, and the whole charge is forced back through the first cell into the main combustion chamber. Pressures in the air cells will rise to quite high values — 1200 pounds, or sometimes, even higher.

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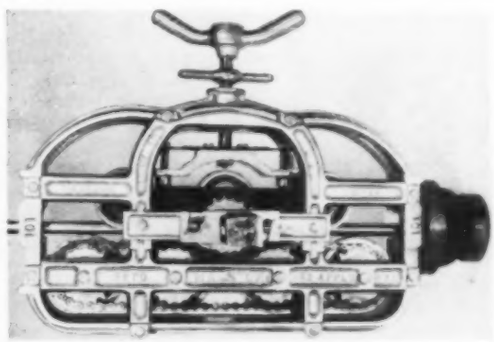

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Jones Snap-Tite Wrench

THE S. M. Jones Company announces a new snap wrench for tightening sucker rod joints. Specially designed and engineered to assure maximum tightness of pins and couplings this new wrench delivers an extra "wallop" in bucking up joints—is easy to use and fast. Its "straight line" construction—from pivot pin in head through center of rod to lever arm—is said to assure maximum wrench torque plus great "shock or impact" in driving home joints. As a result of these advantages it is claimed that the service life of sucker rods can be materially increased—unnecessary failures at the joint eliminated.

Rugged construction features include drop forged, heat treated, alloy steel jaw—cast alloy heat treated handle with weighted end to give more punch in bucking up joints—less fatigue and no "sting".

These new wrenches are available for $\frac{5}{8}$", $\frac{3}{4}$", $\frac{7}{8}$", 1" API sucker rods, with handle lengths of 12", 14", 16", 19", and weights of 4#, 6½#, 7# and 10# respectively.

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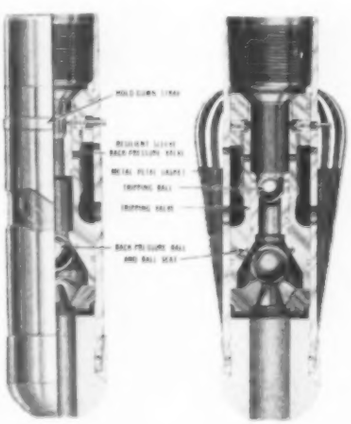
THE new Baker Triplex Cementing Shoe combines three distinct features into one unit: (1) It has all of the features of the Baker Cement Whirler Float Shoe for guiding, floating and cementing a string of casing; (2) The Petal Basket attached to the Triplex Shoe forms a bridge, even in an irregularly shaped hole, to prevent the cement slurry from settling into permeable low-pressure zones below the Shoe; (3) All of the cement slurry is directed through the side whirler ports and a reinforced resilient rubber sleeve-type back-pressure valve prevents a return flow of the cement slurry. This eliminates the necessity of maintaining pressure on the casing to prevent the cement back backing up the pipe.

Secured to the lower end of the casing, the Triplex shoe operates as a conventional Float Shoe during the running-in, washing and hole conditioning operations.

After proper conditioning of the mud, the Tripping Ball (drillable) is pumped, or allowed to gravitate, down to engage the Tripping Valve. A pressure of 400 to 500 psi is applied to the casing, which shears the screws in the Tripping Valve and permits it to move downward exposing the cementing ports and releasing the strap around the basket, thus allowing the Basket to expand outwardly against the well of the hole. The cementing operation is then carried on in the conventional manner. The cement is forced ou the side whirler ports, as the central passage of the Shoe is plugged off by the Tripping Ball.



New Catheads

GEMCO OIL TOOLS, INC. has recently developed a complete line of new and improved breakout and spinning catheads. The line consists of a super automatic positive clutch type breakout cathead, a plain automatic positive clutch type breakout cathead and a (3 in 1) friction clutch type breakout, spinning and combination make-&-break cathead and many scientific engineering developments offered to the industry for the first time.

Each of the three different types is built around a common base assembly consisting of shaft adapter for adapting to any size or type lineshaft, adapter retainer, roller bearings and spool. On this base assembly may be mounted any one of the different cathead units, thus permitting complete interchangeability of all types. The base assembly is also a complete unit within itself and may be used independently without the cathead unit when doing work requiring only a spool.

Installation has been simplified by the use of a standard anchor for all models. The anchor also serves as a mounting for optional hydraulic, pneumatic, steam or mechanical operating control. The cathead may be removed from line shaft without disturbing either the anchor or operating controls.

The 3 in 1 friction clutch type may be mounted and will operate with equal efficiency on either side of the drawworks, and when mounted may be changed from breakout to spinner or vice versa by changing only the line. It employs an internal expanding friction clutch that requires no adjustments, thrust bearings or toggles.

The super automatic positive clutch type is now vastly improved to insure smoother operation, greater safety and lower maintenance cost. The safety jerkline shoe can now be removed from the grooved drum and replaced without the aid of tools. A ratchet type operating mechanism prevents repeat operations even though the operating lever is not released by the operator. No accidental engagement or disengagement is possible.

The plain automatic is designed to fill a need for a low cost utility unit. It has the lowest jerkline speed of any cathead of this type. The shoe is disengaged by a cam from underneath that forces the shoe upward, thus eliminating heavy impacts. The shoe is locked in disengaging position when not in use. All models are fully interchangeable, and may be changed from one shaft to another.

Slush Pump Designed for 15,000 ft. wells.

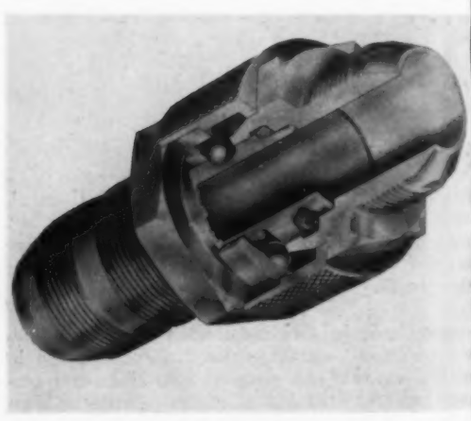
Powerful Slush Pump

ONE of the problems encountered in deep-well drilling is that of maintaining the velocity of the slush at sufficient rate to carry away the cuttings. The available slush pumps have been too small to keep up this rate of circulation, and the need for a big pump has long been realized. To meet this need Bethlehem Steel Co., Inc. have developed what it calls the G-600 pump to provide the necessary gear-end capacity to maintain high circulation rates without the necessity of compounding two pumps. Discharge pressure and volumes range from 2,910 psi. and 295 gpm., with the 5-in. liner, to 1,118 psi. and 767 gpm. with the 7¾-in. liner, at 75 rpm. and 600 hp. power input.

Incidentally, Bethlehem claims that this pump has the largest capacity of any power pump now in use by the oil industry. It is designed specifically for wells up to 15,000 ft. and on location in West Texas has shown itself thoroughly capable of carying the load involved.

The G-600 Power Pump is a 7¾ x 18 in. duplex, double-acting pump designed for versatility and flexibility in handling large quantities of drilling fluids at high pressures. It is the first pump of its kind built to weigh only 40,000 lbs. with such a large horsepower rating. Light weight and great strength have been made possible through the use of alloy-steel forgings and castings throughout.

An important feature of this big pump is the three-phase lubricating system which insures proper lubrication for each bearing surface and eliminates the possibility of mud or other foreign matter getting to the highly machined surfaces of the working parts. The gear and mating pinion are isolated from the rest of the pump, operating in an individual oil bath cast integral with the frame. Every roller bearing, including the crosshead pin bearing, is individually housed and pressure greased from conveniently located fittings.



New Pressure Coupling

A new Quick Coupling especially designed for use on hoses and lines operating under pressure has been announced by the Roylyn Mechanical Laboratory. Engineered for safety and simplicity, the new coupling is particularly adapted for hydraulic and pneumatic lines running from pressurized tanks such as truck and trailer connections, fuel lines, paint and insect sprayers and air-driven tool.

Based on the "inclined plane and wheel principle", the Roylyn coupling employs but three major parts—the cam ring, ball cage, and nipple. By rotating the cam collar steel balls are forced inward into a groove in the nipple forcing the halves together. The gasket retained in the ball cage provides a positive seal against dirt as well as being the separating spring force necessary to the operation of the lock. A slight shoulder on the cam assures a positive lock; application of more pressure tightens it, and only the cam collar can unlock it.

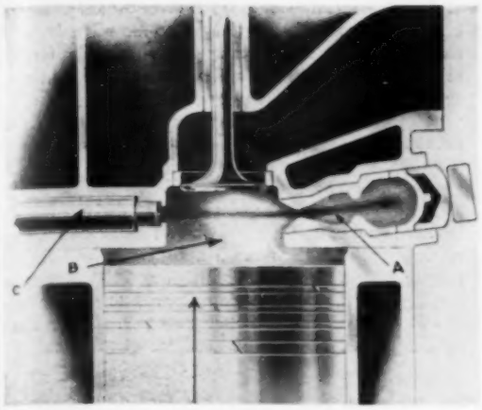


Fig. 1. Fuel Intake.

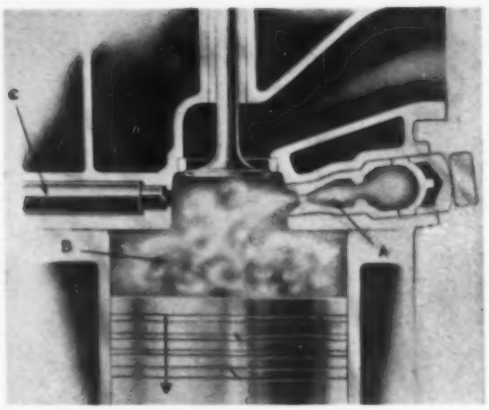


Fig. 2. Power Stroke.

New Kind of Diesel Engine

CONTINENTAL MOTORS CORP. have started production of a new line of industrial and transportation Diesel engines ranging from 25 to 150 horsepower. Additional models of higher horsepower will go into production in a few months.

The outstanding characteristic of the new Continental Diesels is in what the company describes as a "cushioned power" combustion chamber which causes delayed burning of the fuel and makes possible low working pressures on the cylinder. The combustion chamber itself is of the open type, and is relatively small, being confined to the area under the exhaust valve. This facilitates starting in cold weather, as the valve and chamber reach near-normal operating temperatures after only a few revolutions. All models start directly on Diesel fuel.

Directly off the combustion chamber and opposite the injection nozzle is a double air cell, which is described as a "Dyna-cell". Its operation is simple. The stream of fuel sprayed by the injection nozzle is relatively coarse —something more than 1/16 inch in diameter at its core, and fringing off into spray at the sides. The spray immediately ignites with the fuel in the open chamber, while the coarse portion of the stream is directed into the air cell on the far side of the chamber. See Fig. 1. As the burning occurs within the main combustion chamber, the pressure in that chamber rises and tends to flow into the air cells with the stream of coarse fuel directed there by the nozzle. While this is occurring the engine crankshaft is rotating and is moving the piston through the top of the compression stroke and starting downward on its power stroke. See Fig. 2.

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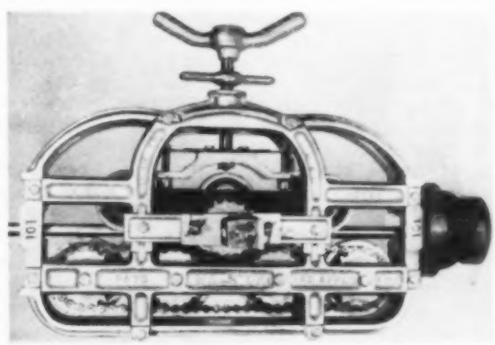

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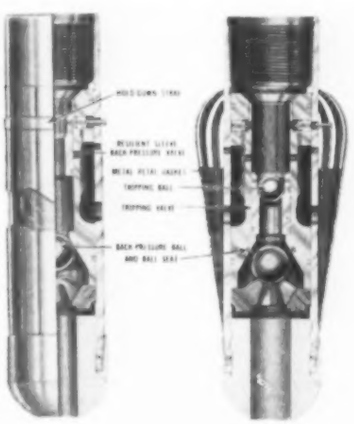

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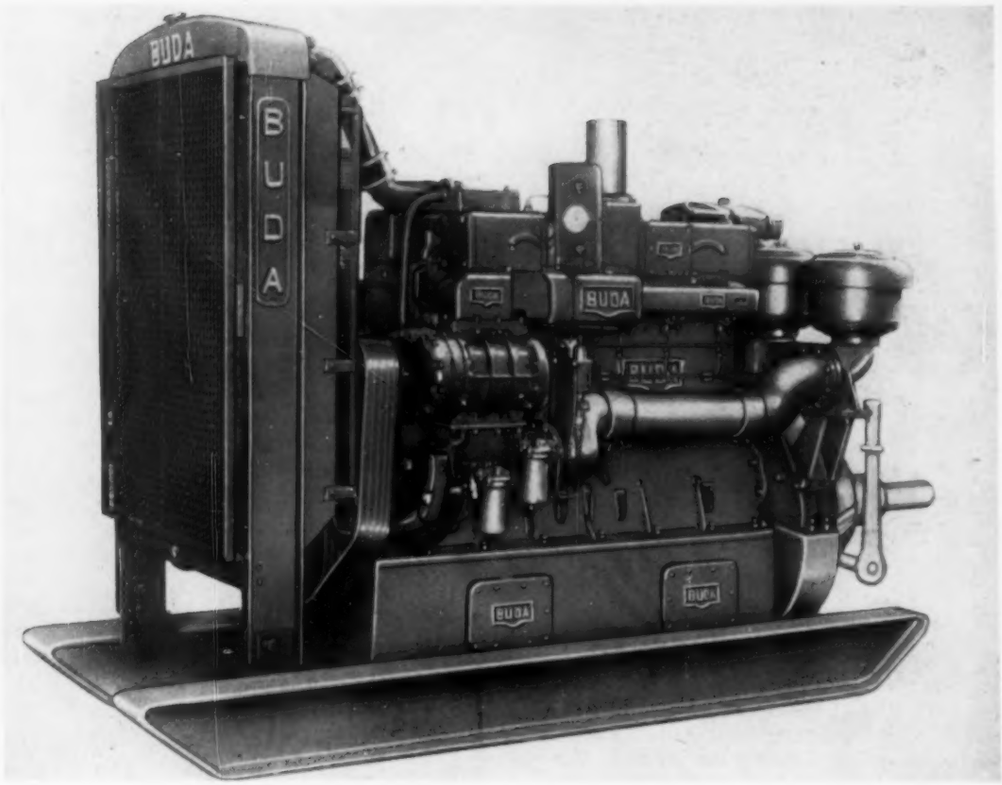


Supercharged Diesel Engines

DURING the war the Buda Company developed a supercharged Diesel engine for the use of the Army. With the return of peace this development has now come on the market as the Buda 1879 Supercharged Diesel Drilling Engine. According to reports received by the company from one user, a pair of these engines drilled a well 6,635 feet and the crew pulled the whole length of this pipe in one hour and fifteen minutes. Another pair of the Buda engines at another location pulled forty-two triples in fortyseven minutes, and 6,400 feet of 4½-inch drill pipe in one hour and forty minutes.

The engine is of the vertical, overhead valve, four cycle, full Diesel, supercharged type, with six cylinders, base 6¾", stroke 8¾", displacement 1879 cu. in. The crankshaft is drop forged from open hearth steel and heat treated. It is statically and dynamically balanced, and drilled for pressure lubrication. The seven main bearing surfaces are specially hardened.

The capacity of the cooling system is 33 gallons. Radiator capacity only, 17 gallons. There is a centrifugal water pump, driven from the accessory drive shaft, with pump shaft of alloy steel. The pump runs at one and one-half times the speed of the engine.

Cylinder and crankcase are in one casting of chrome nickel iron, carefully ribbed to insure rigidity and permanent alignment of crankshaft bearings and cylinder sleeves.

A full circulating pressure lubrication system is provided to force oil under pressure to all crankshaft bearings, camshaft bearings, connecting rod bearings, timing gears and rocker arms. Wet sump system. Lubricating oil capacity of cast iron base is 23 gallons.

There is one nozzle per cylinder, of the pintle self-cleaning type. The spray is horizontal, parallel with the piston head and does not strike pistons or cylinder walls. Nozzles are easily removed for inspection. All fuel and lubricating oil to engine passes through ample size filters, readily accessible from outside for cleaning. Compression ignition is used for both starting and running.

The supercharger is of the belt-driven, positive displacement type with helical form rotors to obtain quietness. Needs no attention except periodic lubrication. Strong ball-bearing equipped, belt adjusting idler pulley. Extra capacity belts for long life—5 used.

Weights, including starting engine, radiator and clutch, 11,155 lbs. Shipping weight, 11,500 lbs. Export weight, 11,850 lbs. Cubic contents, 352 cu. ft.

Steamizer Oil Gun

THIS Steamizer Oil Gun, manufactured by the John Zink Co., is designed for use in driling boilers, forges, oil heaters, power boilers, metal pre-heating and heating services.

It is a universal burner in that it is adaptable for either vertical or horizontal firing for oil only, or in combination with gas in registers suitable for any service. A wide turn down range, ease of lighting, a symmetrical flame of any required shape, low steam consumption and low oil pressure requirement for normal duty are a few of the many features.

Crude oil or any commercial fuel oil may be burned so long as the viscosity of the oil as delivered to the burner is not more than 300 SSU. Distillates and light crudes require little or no heating while heavier fuels may require temperatures as high as 200° F or more. High gravity crudes containing paraffine require heating for operation in low temperatures. Either steam or compressed air may be used for atomization.

Treater for Foaming Type Emulsions

The Parkersburg Rig and Reel Company's Type 1 self-insulating emulsion treater was designed for treating all but the heavy "foaming type" of emulsions. For handling the latter, Parkersburg has now brought out a Type 2 treater illustrated in the accompanying diagram. The operation is as follows:

The emulsion enters the treater through inlet F into the surge and degassing chamber. Any mist or light elements which tend to rise with the free gas in this chamber are collected by the mist extractor, H, and returned to the surge chamber. Free gas is carried off through outlet G.

From the surge chamber the emulsion travels downward through the annular heat exchange space, M, between the walls of the inner shell, K, and the outer shell, J.

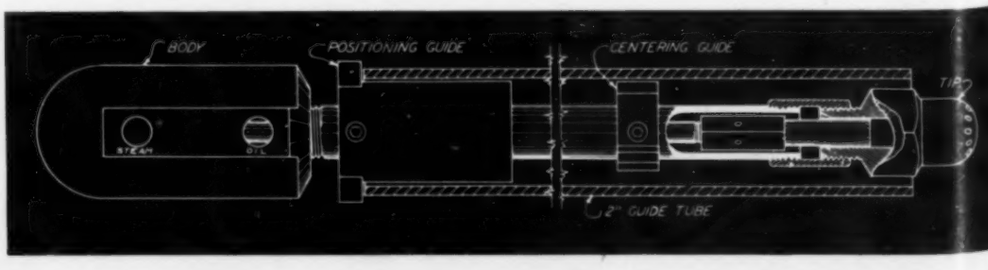
Tests have shown that free water in the emulsion drops down between the walls of the two shells very rapidly and leaves the remaining emulsion to absorb the heat from the walls of the inner shell. This preheating of the emulsion which takes place at this stage does much toward breaking it down and freeing the oil before it reaches the bottom and enters the salt-water bath in the inner shell.

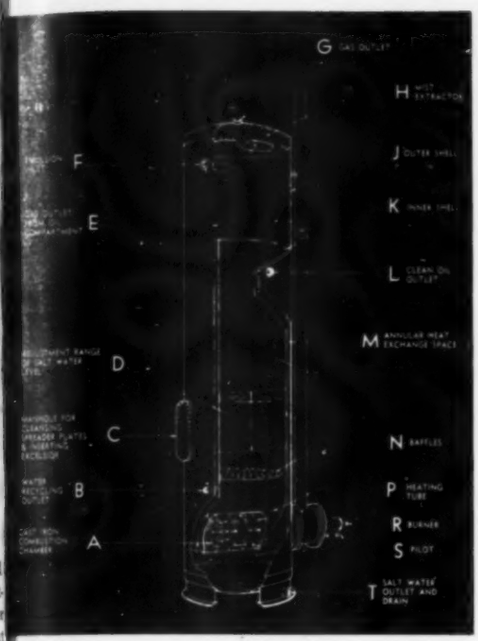
The preheated emulsion enters the inner shell at the bottom and passes upward through the hot salt-water bath heated by the heating tube, P. The perforated baffles, N, through which the emulsion rises, break up the globules still further and knock out any water still remaining in the emulsion.

The level of the salt-water bath is adjustable between the two points indicated by D.

In some cases it may be desirable to mix the emulsion with hot salt-water as it enters the treater. In this event, hot salt-water for this purpose is drawn from recycling outlet B.

An extra large amount of oil settling space is provided in the Parkersburg Treater. Any remaining gas given off in the oil settling space is carried off through outlet E, and thence through the mist extractor H and outlet G.





manhole, C, is provided for cleaning or removing he baffles, N, or inserting excelsior.

he combustion tube is made up of circular cast iron ections which are held in proper position and spacing y integrally cast lugs on the outside of the sections.

he sections are placed inside the heating tube with he lugs staggered so as to impart a spiral, wiping otion to the flow of the hot gases trave'ing between he outer surface of the combustion tube and the inner urface of the heating tube.

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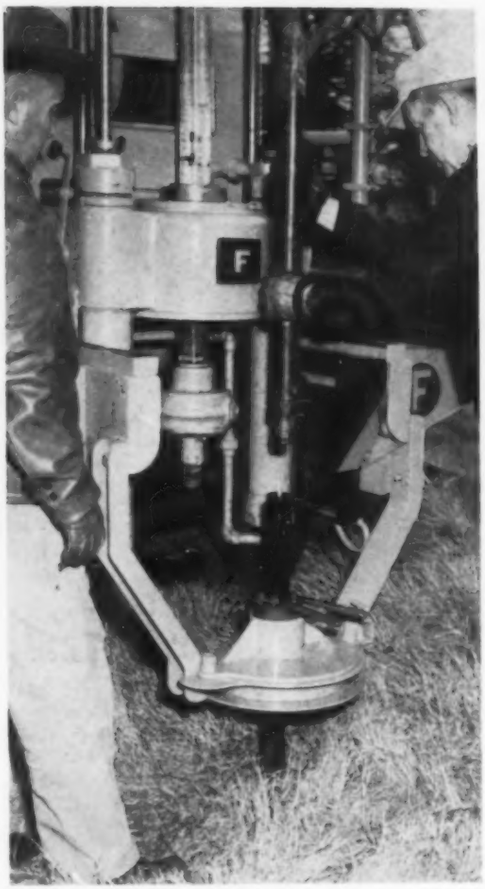
here is no way in which the burning gases inside the ombustion tube can impinge upon the heating tube. hus no hot spots can develop and cause excessive ale deposits. Heat can reach the heating tube only the form of hot gases and radiant heat from he alls of the combustion tube.

he hottest part of the flame in the fire tube is nearest e burner. It follows, then, that the amount of radiant at absorbed by the oil outside the heating tube radually decreases along its length. However, the ottest gases are at the rear of the combustion tube. s these hot gases travel back toward the stack beeen the outside of the combustion tube and heating be the amount of heat they give off through the eating tube by convection and conduction gradually ecreases.

hus more heat is absorbed at the front of the tube as adiant energy and more at the rear of the tube by nvection.

ew Swinging Spider

NEW swinging spider arrangement on portable ills for holding the drillpipe while making it up or eaking it out, has been announced by the Geo. E. ailing Supply Company. The new spider is designed handle up to 400 feet of drillpipe and it saves nsiderable time in setting up since it eliminates e need for levelling or aligning, required with the nventional footclamp or spider.



The swinging spider frame is fastened permanently to the bed of the truck on a hinge. It looks down in place for drilling operations or locks up for road travel. The spider bowl also is hinged and swings horizontally away from the hole easily and quickly while drilling or setting large diameter surface pipe.

The new spiders are listed as optional equipment on Failing Drill Models 314, 314-C and 1500. Installation of the spider is simple and the Failing Supply Company carries them in stock for the three models mentioned.

New Spudder

A NEW all steel portable spudder—the 28-L for drilling and servicing to moderate depths—has been announced by Bucyrus-Erie Company. This is the fourth of this company's current spudder line, which also includes the larger 36-L and the smaller 24-L.

Similar to the 36-L in design and construction, the 28-L is built to drill top-to-bottom oil and gas wells to 2500 feet, to handle drilling-in operations, cleaning-out, repairing, and other servicing work to much greater depths.

Outstanding features of the 28-L, according to Bucyrus-Erie, are its portability which permits fast job-to-job moves; its easy rigging-up; its fast line speeds and powerful line pulls; its accurate control and efficient drilling action.

The derrick is a cantilever-braced, latticed box structure of the telescoping type, raised and extended by a built-in power winch. It can be erected in less than a half-hour. With extra casing tackle, it has capacity for handling up to 45,000 pounds, static load; an auxiliary derrick leg (extra equipment) permits loads as high as 75,000 pounds.

Mountings available are dual pneumatic-tired semi-trailer with trailer hitch, and skid-type base for sliding to oil-field trucks. Reels include bull reel, sand reel, and casing reel. All have two speeds forward and one reverse, are controlled through operating levers grouped at the machine's drilling end. The bull reel spools up to 4620 feet of ¾-inch line; sand reel spools 4450 feet of ½-inch. Fully automatic spooling saves cable by preventing piling up and pinching on the reels.

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Fast, Heavy-Duty Truck

THE truck division of Eisenhauer Manufacturing Company announce a new type truck, especially designed for fast, long distance hauling. The vehicle, which has a payload capacity of approximately 20 tons through special arrangement of wheels, using 16 Goodyear Hi Miler heavy duty tires, is known as the Eisenhauer Twin Engine truck.

Several new features in truck transportation are incorporated. These include what is believed to be the first successful application of four front steering wheels for commercial use, which make possible greater load capacity through better distribution. Easier steering is accomplished through the use of four front wheels in tandem relation rather than dual relation, thus eliminating the need of power steering. The truck has three rear axles, including two driving or "live" axles, with a "dead" axle between. Dual wheels are on all three rear axles, and singles on the two front axles. Greater traction is achieved because of remote spacing of the live axles.

Overall length is 35 feet with a truck bed of 25 feet. The frame is rigid and will do the same job as tractor-truck trailer combinations. Because of the flexible type of suspension, the frame remains level and does not rock. The truck is powered by two standard make 93 horsepower motors mounted in line, one under the hood and the other motor beneath the cab. The front motor is directly connected to the front rear exle and the rear motor to the rear-most axle. The motors can be used together or independently. The power selection can be made at the will of the driver at any road speed while in any gear. The torque output of the two engines is balanced by a torque equalizer actuated by manifold pressures.

Another feature is the spring suspension which involves the use of a plurality of axles under a vehicle wherein some of the axles are laterally shiftable. Adequate lateral movement takes place in the wheels and axles when the vehicle is making turns. The springs of the adjacent axles insure proper contact of the wheels under all road conditions. The special spring suspension method allows any set of dual wheels to rise or drop with the level of the road, the frame, bed and load remaining level. The rear axle and wheels follow, helping the double front steering wheels to turn on curves instead of skidding around the back end of the truck to the detriment of the tires.

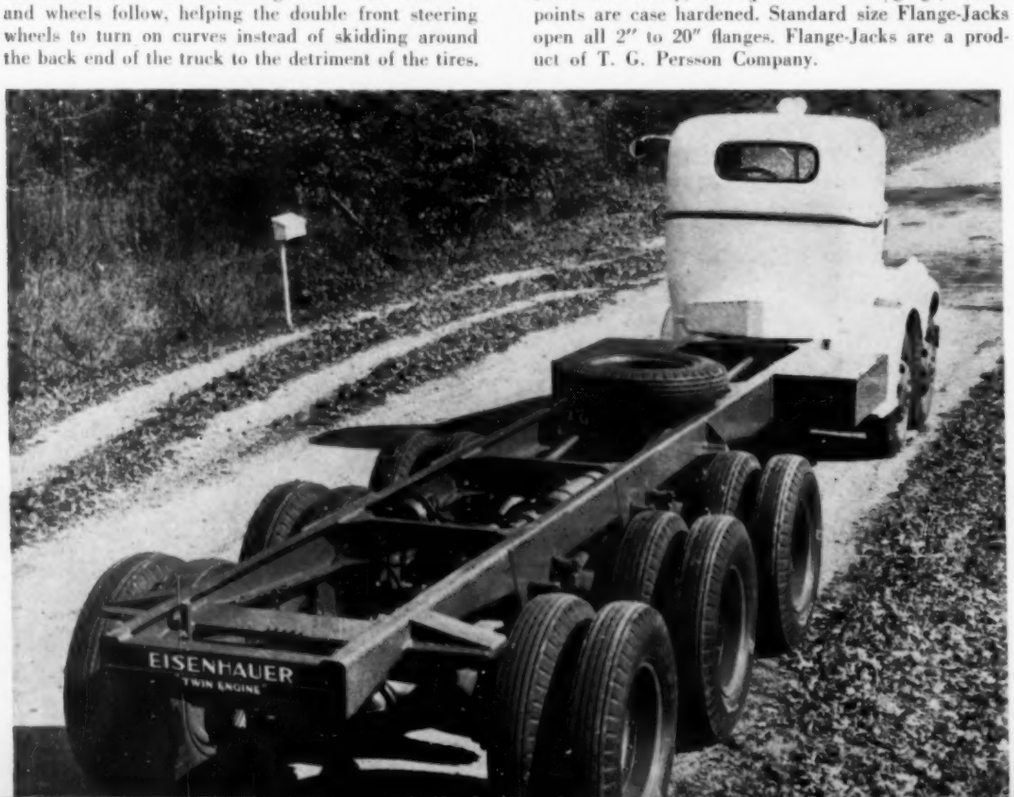
New Tool Permits Working Safely in Cramped Locations

Tool for Replacing Gaskets in Flanged Pipe Lines

THIS new tool opens pipe flanges for gasket renewal — quickly, easily, and safely. Eliminates the hazardous hammer and chisel method. With Flange-Jacks, pipe flanges may be opened or closed without damage to flange faces, and without danger from sparks. Danger to personnel from chips and flying wedges is eliminated.

Flange-Jacks operate easily in tight, cramped locations. They exert tremendous pressures smoothly and evenly — eliminating vibration along the pipeline and the possibility of causing new leaks in nearby joints. Flange-Jacks are capable of opening joints against a load of 15 tons — without damage to the flanges. As pressure is exerted, flanges open evenly, without shock, and bolt holes are maintained in continuous alignment. Closures are accomplished in a similar manner.

Jaws are heavy, one piece steel forgings, screw points are case hardened. Standard size Flange-Jacks open all 2" to 20" flanges. Flange-Jacks are a product of T. G. Persson Company.



New Oil-Base Mud

A NEW addition to the Black Magic line of drilling muds known as "Light" Black Magic, has been perfected by Oil Base, Inc., for drilling depleted or weak zones. This new, easily mixed mud is for drilling at lower pressures than previously permissible. "Light" Black Magic has the same quality of "Regular" Black Magic, but makes up 60 lbs. per cubic foot, or the equivalent of 8 lbs. per gallon, allowing zero filtrate loss and free flow of cuttings to the surface.
One sack of 'Light" Black Magic makes up one barrel of oil base drilling fluid. It contains water contamination and regenerating qualities.

Improved Oil-Well Plunger

THE Gustin-Bacon Manufacturing Co. announces an inexpensive plunger that will give a longer, more efficient service even where excess sand, water or gas is encountered. It will be called the G-B expanding seal plunger.

The plunger consists of a steel core on which are assembled a series of oil-resisting, synthetic rubber split rings which work in connection with metal spacers so that they automatically expand to the pump barrel wall on the lifting stroke, providing a perfect seal and preventing oil slippage, and then contract and move off the cup seat on the return stroke, reducing friction and wear and allowing any sand to be washed away with the oil. This action also allows any gas trapped between the pump valves to escape, preventing gas locking of the pump.

New "Air-Lok" Valve

A NEW type of valve, designated as the Davis Air-Lok, for use on gathering lines connected to oil field lease tanks, is announced by the Davis Regulator Company. The primary function of the Air-Lok is to automatically close the line in which it is installed as soon as the withdrawal of liquid is completed and before any air or vapor is pumped into the system.

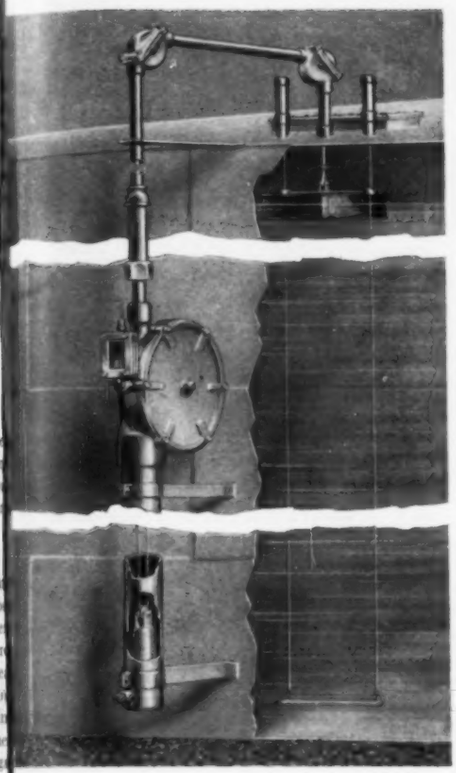
Several benefits are secured: air and vapor are kept out of the gathering system, which can cause trouble all the way down to the refinery; there is less likelihood of pumping equipment becoming damaged by racing under a no-load condition. By effecting a tight stut-off in the line, it becomes practical to install a vacuum switch in the line near the pump, which will stop an electric or gasoline pumping engine soon after the valve closes.

At present, the Air-Lok is offered in two sizes with flanged connections for use on 3-inch or 4-inch lines. The body is made up of semi-steel castings and the interior trim is corrtsion-resistant nickel iron.

Condensers and Coolers

AN important advance in heat exchangers is explained in a new bulletin which has been issued by The Griscom-Russell Co.

The first half of the bulletin describes the Fin-Fan Exchanger, a "package-type" unit, jointly developed by The Griscom-Russell Co. and The Fluor Corporation, Ltd. More than twenty advantages of this exchanger for condensing and cooling fluids without the use of water are concisely outlined, and typical applications are listed to show the wide adaptability of the unit. Illustrations of installation show how these exchangers are adapted to large or small heat transfer requirements.



ew Gauge Float

HAND and Jurs Company has announced a revolu-nary new development in floats for tank gauging. he new float consists of Foamglas, a new glass pro-ct of the Pittsburgh Corning Co. which cannot sink d is said to be suitable for practically all service nditions. An accompanying drawing shows applica-n of the new float to a low pressure automatic tank uge.

e Foamglas float consists of a flat block of the ma-ial held together by substantial members of stainless el. The Foamglas comprises thousands of tiny in-pendent pure glass cells resembling sponge rubber. average specimen has approximately 3,000 cells cubic inch. It has a specific gravity of .17 and a shing strength of 150 lbs. per square inch. Its orption in water is 2% by weight at the surface y.

e standard float supplied with most of the gauges is cased in a stainless steel jacket with open corners as not to subject the protective case to pressure. is jacket protects the glass against damage during pment and installation, and affords a relatively cor-ion proof permanent housing for the bouyant part the float. The standard float is also provided with bstantial eyes for the guide wires to pass through. d a clip by which the tape or cable is attached. ats are being supplied for working pressures up to lbs. The combination of stainless steel and glass ders the float perfectly satisfactory for use in a ch wider field of services than would any one metal.

ire Line Stripper

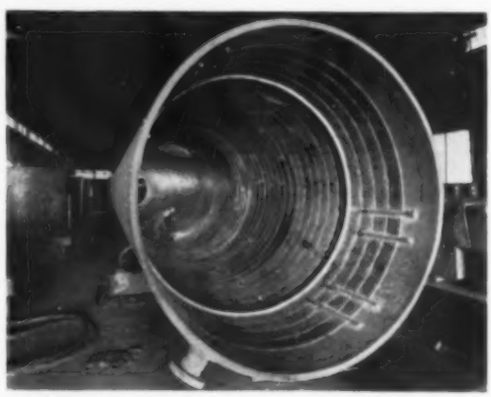
HE Regan Forge & Engineering Company an-unces the manufacture of a new Wire Line Stripper, ploying a new principle. This device has a wiper ber confined within a steel housing. When acted n by an outside source, the rubber contracts, clos-around the line. Source of pressure may be CO_2, nitrogen or any other non-oxidizing gas. Con-lled pressure is used to maintain a constant contract between the rubber and wire line at all times, insuring an orderly and clean wiping job. A new bulletin describing the device is now ready for distribution.

Improved Shale Separator

THE new Thompson "DW" Model shale separator and sample machine (Thompson Tool Company) has improvements not heretofore found on any self-motivated shale separator. It has been increased in size to the extent of being capable of handling the flow of mud from the largest mud pumps now in operation. The power wheel has been redesigned and increased in size of greater efficiency. The number of water jets has been increased and relocated on the side of the drum where their function will not be hampered by any wind.

This shale separator is now available in three models to fit requirements for the smallest and deepest wells. The drum in all models is constructed from a solid tube of metal cut to form spirals on the inside. An adjustable stretcher rod keeps the screen tight and smooth; the screen is easily replaceable.

Each of the sizes is available with or without a sample machine. This sample machine provides accurate foot by foot samples of cuttings. It is located at the side of the separator and is easily accessible. This accessory represents only a small additional investment, but is said to pay for itself in savings alone in a very short time.



Alloys

THIS 63 foot isomerization tower, when in use, contains an aluminum chloride catalyst which hydrolyzes during the isomerization process. The tower is lined with Hastelloy alloy B to resist the hydrochloric acid that is formed when the hydrolysis takes place. The alloy liner used is one of the four Hastelloy brand nickel-base alloys designed to resist chemical corrosion.

Lining of isomerization towers is only one of the many uses of Hastelloy alloys. The unusual combination of mechanical and chemical properties of these alloys make them extremely valuable to the chemical and process industries. For example, Hastelloy alloys A and B which are intended particularly for resisting Hydrochloric acid have tensile properties comparable to high strength steel. Hastelloy alloy C withstands the action of oxidizing agents such as wet chloride and is comparable in strength and ductility to alloy steels. Hastelloy alloy D has considerable hardness and wear resistance and is especially suited for handling sulphuric acid.

Hastelloy alloys are available in many forms such as welding rod, bar stock, wire, welded tubing, pumps, valves and sheet and plate. Complete units can be fabricated from these alloys. Autoclaves, evaporators, agitator units, fractionating columns, and other standard or designed pieces of equipment are being made regularly.

Corrosion Survey Service

OTIS Pressure Control, Inc., through an arrangement with the Sun Oil Company, has been granted an exclusive license to provide a corrosion survey service for internal inspection of well tubing by use of a new instrument to be called the Otis Tubing Caliper. This instrument, was designed by P. E. Chaney, and W. E. Barnes, Sun petroleum engineers. The caliper has been used successfully in high pressure wells to detect and record both the extent and location of corrosion.

Deep Well Swab

THE latest oil tool to be drawn from the Patterson-Ballagh engineering department is the Deep Well Swab. Several months have been spent in experiments, engineering and development tests. A study of extreme depths indicated the need for a swab which could pull both light and heavy loads through long strings of tubing without loss of fluid, one that would bring to the surface a complete load each trip. Need also was found for a swab with a large fluid passage. Economical swabbing could only come from a rubber which had a positive seal against the swabbing string.

The new swab meets industry needs through:
(a) The development of a rubber which will expand under a very light load. The rubbers were reinforced with proper cup support which keeps them in place under very heavy loads.

(b) A rubber was built which will expand from a fluid pressure below the swab. This action holds the swab down when the well starts to flow, preventing it from blowing out of the hole.

(c) The rubbers were made adjustable both to the irregular I.D.'s of tubing and to compensate for wear. This feature prolongs the life of the rubbers, gives you maximum service and reduces cost of rubber replacement.

PRINT IN BINDING

Settlement of Expropriation Near

Mexico City

ALMOST eight years after the expropriation of foreign owned soil properties a settlement of the final claims arising from that action appears to be practically assured. Through negotiations between representatives of the Mexican government and the State Department of the United States payment for American owned properties was agreed upon several years ago but at that time British and Dutch nationals who were the major stockholders in the Mexican Eagle, largest of the foreign owned companies, maintained their demand for return of the properties to their possession. In this position they were supported by their respective governments. During the war the matter remained in abeyance and it was only a few months ago that discussion of the issue was taken up with a serious purpose of arriving at a mutually acceptable adjustment.

Approaching the problem in this spirit a basis for determining the value of the properties taken over by the government was reached in a surprisingly short time as such matters go. Essentials of the proposal jointly accepted by the British and Mexican governments, which is exactly the same as the one agreed upon by Mexico and the Netherlands, are indicated by the following extracts from the agreement recently made public:

"Each of the two governments will appoint, within the thirty days following the date of this note, an expert whose duty it shall be to undertake a final estimate of the rights and interests of British subjects in and relative to such petroleum industrial properties in Mexico affected by acts of the government of Mexico subsequent to March 17, 1938, as may be determined by mutual agreement between the two governments.

"In order that it may be possible to determine the value of the said rights and interests of British subjects, the experts appointed in accordance with the preceding paragraph shall proceed to the valuation of the properties, rights and interests in Mexico with respect to which the said rights and interests of British subjects exist.

"The experts, in accordance with the procedure and in the manner set out in this agreement, shall determine an adequate valuation of the said properties, rights and interests, basing this upon their value at the time when they were affected by acts of the government of Mexico. In arriving at this valuation the experts shall ignore considerations of a technical character and shall proceed on a basis of justice and equity.

"The experts shall also fix an equitable interest which shall be calculated on the valuation arrived at in accordance with the preceding paragraphs; this interest shall accrue as from the date fixed by the experts.

(a) The amount determined under the preceding paragraph shall be added to the amount of valuation determined under paragraphs 2 and 3.

(b) All amounts determined by the experts, under this agreement, shall be assessed in United States dollars.

"The experts shall hold their first meeting in Mexico City as soon as possible, but in any event within six months following the date of the appointment last made by either government. The later meetings and other activities of the experts shall take place, within the time-limits laid down in this agreement, on such dates and in such places in Mexican territory as the experts themselves determine.

"Each of the governments shall designate such assistance as the respective experts may require for the better accomplishment of their task.

"The experts shall at all times closely collaborate and cooperate in their valuation proceedings. They may obtain directly such data and evidence as they may consider pertinent to forming their opinion, or receive them from interested persons and institutions and from the governments of Mexico and of the United Kingdom.

"The experts shall have free access to all records in the possession of the government of Mexico as well as to oil fields, lands, installations, offices, buildings and any other properties whatsoever involved directly or indirectly in the valuation. The United Kingdom expert shall, at the request of the Mexican expert, request the interested persons and institutions to furnish any pertinent evidence relevant to evidence already furnished by them. Any refusal on their part to comply with these requests shall bring into application the relevant provision of paragraph 13.

"As soon as one expert obtains or learns of any pertinent data, reports or evidence he will inform the other. Either expert may request from the other the furnishing of any data, reports or evidence for any reason is available only to the other.

"Within a period of three months from the date of their first meeting, the experts shall obtain and receive all data, reports and evidence; nevertheless, a further period of one month shall be allowed for the presentation, by either expert, of additional data, reports and evidence completing, clarifying or rectifying the material obtained or received in the said period of three months.

"The experts shall examine and appraise all proofs obtained directly by, or that may be submitted to, them. The experts shall not take into account any specific proofs rendered "ex parte" when the person or institution furnishing them refuses to furnish pertinent complementary evidence requested by the United Kingdom expert in accordance with the terms of paragraph 10 above.

"The experts shall complete their work within one year from the date of this note. If they are in agreement regarding the amount of the valuation, they shall render a joint report to the two governments.

"Both governments agree to accept as final the joint report of the experts.

"If, within the period indicated in paragraph 14, the experts are unable to reach agreement as to the whole or part of the matters submitted to them, each one shall, within an additional period of one month, submit to his government a separate report on any matters in respect of which agreement has not been reached.

"Within a month of the receipt of the report or reports of the experts, the two governments shall initiate diplomatic negotiations with a view to fixing, in the case of agreement between the experts to which paragraph 15 refers, the sum to be paid, on the basis of their joint report, to those British subjects who, by such methods as the two governments may determine, prove their participation, as shareholders, at the time of publication of this note, in properties, referred to in paragraph 1 thereof. The same shall be applied in the case of disagreement between the experts to which paragraph 16 refers, on the undertaking that negotiations shall also be directed to the settlement of any points of disagreement between the reports of the two experts.

"The two governments shall agree without delay upon the methods and time-limits for payment, through the government of the United Kingdom, of the compensation and interest due to British subjects, on the understanding that this payment shall be made in United States currency. The said interest shall run until total payment of the compensation, which, however, shall be completed within a period not exceeding seven years as from the date on which the two governments shall have reached an agreement regarding the compensatory procedure to be followed."

Capital Sidelights on Oil

By W. J. Maddox, Chief of World Petroleum Washington Bureau

Commerce Forms Oil Section

James H. Mayes

JAMES H. MAYES, who has been appointed acting chief of the newly created Petroleum Section Department of Commerce, has an intimate knowledge of the oil business at home and abroad, having been engaged for some 15 years in the foreign field, principally in Latin America, and for the past several years on the petroleum staff of federal organizations. In the latter work he was associated with the export control activities of the Board of Economic Warfare and Foreign Economic Administration. Mayes spent five years of his foreign service in the Venezuela oil fields, in production, refining, transportation and marketing.

Commerce's new Petroleum Section is starting out on a somewhat unique theory in government bureau organization; it is going to try to give industry the types of information it wants instead of what the government men think industry should have. As a first step in carryng out this policy, the new section is canvassing industry to find out what specific data should be collected and disseminated to be of the most service.

The section is a part of the department's Office of World Trade Promotion. One of its principal functions is to foster development of the foreign commerce of United States petroleum enterprises. As rapidly as facilities permit, comprehensive and detailed information will be collected and disseminationed on international petroleum developments and, specifically, data on foreign markets for our domestic products. Suggestions from the industry as to the specific nature of assistance desired are invited.

Price Delay Costly

INDUSTRY efforts to get an adequate crude price hike — above the 10 cent increase recently granted — by an amendment to the OPA extension bill that would remove price restrictions from commodities where it could be determined that supply was ample to meet demands have run into a new variety of double-talk. Such an amendment was tacked on the bill (H.R. 6042) as it was reported from the committee to the House, but the question of when supply equals demand is left to the determination of the President. Which throws the question back to OPA, as, of course, Mr. Truman would not make such a decision himself. So the crude price is still — and will be, if the amendment goes through as it now stands — under control of the pricing administration, which has balked all attempts of producers to get the 35-cent boost they demand.

A long, bitter fight can be expected to develop in the House on the bill to extend the life of OPA. Cotton States members are made clean through over the ceilings on cotton, and many of them may line up with the faction that is for throwing out OPA altogether.

As to the 10-cent boost that became effective April 1, Russell Brown, IPAA General Counsel, is still wondering why OPA waited 24 days to grant the increase after it was first announced March 5 with the promise that it would be effective "sometime during the latter half of March." OPA's given reason was that it would aid purchasers of crude in keeping their books. This is "phony", according to Brown, and has no support in industry custom or practice.

"The effect is to deprive the oil producers of the United States of $440,000 per day," Brown says. "Increases in prices of petroleum products, kerosene, distillate and fuel oil, have already been made and are in effect and the consumers of these products were already absorbing the 10-cent crude oil advance before it was in effect."

Protest Lead Reduction

John D. Small

PROTESTS are coming from the oil industry over the action of the Civilian Production Adminstration in restricting the use of lead employed to improve the quality of motor fuel. Objections from refiners, especially the smaller independents, have been pouring into the office of Director John D. Small and the Western Refiner's Association at its annual meeting adopted a resolution calling for a Congressional investigation of the methods of lead procurement and allocation.

"Decreased allocation of lead is a blow to every motorist", declared President William R. Boyd, Jr. of the American Petroleum Institute. "It is futile to grant permission to oil companies to produce 80 octane gasoline without allowing sufficient Ethyl fluid to make it. In effect the petroleum industry is being penalized for its unselfish cooperation after V-J Day in accepting a temporary allocation insufficient for it needs".

Davies Leaves Post with Wide Acclaim

MAIN activities of PAW were terminated and most of its personnel dispersed at the end of December. This was in accordance with the promise of Administrator Ickes and Deputy Administrator Ralph K. Davies to wind up its affairs as soon as possible after the end of hostilities. Certain problems arose, however, such as the fuel oil shortage which kept Mr. Davies on the job long after he had expected to retire from his position. Finally in desparation he set April 30th as the deadline when he would definitely be through and when he hoped that PAW would finally pass out of existence.

In yielding up the post that for five years has required the most intense application and the constant exercise of firmness, tact and prompt judgment Mr. Davies has the satisfaction of knowing that he carries with him the respect and esteem of all those who have been brought into contact with the Office of Petroleum Administration. Certainly no man connected with the government's war agencies has worked harder and more conscientiously or has better deserved the Legion of Merit award conferred upon him by the President.

As the citation accompanying the awards relates he "organized and directed the unique government-industry combination that achieved one of the outstanding victories of the war — the assurance of petroleum for every military and essential civilian need of the United Nations" and it sums up the qualities contributing to his success by recording: "To these high duties Mr. Davies brought profound oil knowledge, an incisive intellect, rare vision, the quiet power of a gifted organizer and executive, the courageous devotion of a man characterized by unflinching determination and a deep sense of public service."

Ralph K. Davies (left) Receiving Legion of Merit Award from President Truman

International News and Notes

International Consultant

Max W. Thornburg

MAX W. THORNBURG, former vice-president of the Standard Oil Company of California and advisor on foreign operations to the Standard Oil Company of California and the Texas Company, has resigned from his company positions to become a consultant on international petroleum affairs, located in Greenwich, Conn. Mr. Thornburg, who during the war was Petroleum Advisor to the Department of State, has as his clients both private companies and foreign governments. He recently returned from a consulting trip to Central American and Caribbean Countries and is now on a trip to the Middle East which will occupy him for several months.

South American Oil Congress

AT a recent meeting of the permanent international council of the Instituto Sud-Americano del Petroleo (ISAP.) it was decided to hold the first South American Petroleum Congress in Lima, Peru, during the first week of March, 1947.

The program for the Congress as outlined by the council covers a broad range of topics, with particular reference to the actual state of the industry in Latin America, and the possibilities of increasing the production of crude oil and the improvement of refining methods and transportation. Oil legislation and oil economics in these countries, hygiene of oil workers, and the training of oil industry personnel, will be discussed It is announced that Dr. Gustav Egloff will be among the eminent specialists to address the Congress.

Further information relating to the Congress may be obtained by addressing the Seccion Peruana del I.S.A. del Petroleo, Casilla de Correo 889, Lima, Peru, or Comitejecutivo del I.S.A. del Petroleo, Casilla de Correo 416, Montevideo, Uruguay.

India-Burma Line Scrapped

DECISION to scrap the Indo-Burma pipe line made famous during the war has been announced by the Commissioner of Foreign Liquidation in Washington. The decision was reached after it has been found that neither the governments of India or Burma nor private interests wanted to keep the line in operation. The system comprised over a thousand miles of six-inch pipe, pumping stations and equipment, storage tanks and service buildings of various kinds. Its cost was $31,575,000 and it was sold for $,1,376,592 in two lots which were bought by Allen-Berry Company and the Indian Traders Corporation.

ANNOUNCEMENT that the Peruvian government has appointed A. Curtice as consultant to advise in framing a new oil law is taken as indicating a possible change in the attitude of the government toward granting concessions to international oil companies. For a number of years past the policy has been to confine oil development to the government itself or to nationals aside from the concessions already held by private companies. At present the government has four rigs in operation in its Zorian field and is running exploratory tests in the Montana area and in the national reserve near the Bolivian border.

In its developed field near Talara the International Petroleum Company has 19 rotary rigs and eight cable tool strings in operation. Lobitos has 14 cable tool outfits at work. A Peruvian company is planning a test in the eastern Montana region.

JAMES A. CLARK, after twenty-five years in the oil business, the last nineteen of which were spent in Venezuelan oil fields and offices, is being transferred to the production department of the New York office of the Standard Oil Company (N. J.)

Mr. Clark went to Mexico in 1925 as petroleum engineer for the Huasteca Petroleum Company and in 1927 removed to Venezuela as production superintendent for Lago Petroleum Corporation (now Creole).

In Venezuela Mr. Clark was successively field superintendent in La Salina, State of Zulia; general superintendent there; manager for Standard Oil Company of Venezuela and assistant general manager for Creole Petroleum Corporation at Caracas.

REPORTS from Argentina tell of increased drilling activity with 52 rigs in service, 45 of which are operated by VPF. Most of the drilling is in well established fields including Comodore Rivadavia, Huinicul, Mendoza and Vespucio. A strong effort is being made to increase production which fell during the war. According to preliminary figures for 1945 the country's crude output was approximately 22,680,000 barrels as compared with 24,200,000 in 1944, a decrease of six percent due to lack of drilling machinery and supplies.

CHESTER A. BAIRD, who recently assumed the duties of his new appointment as resident manager for Venezuelan Atlantic Refining Company, has a background of thirty years in the petroleum industry.

Mr. Baird became geologist for the Mexican Eagle Oil Company on the Isthmus of Tehuantepec, Mexico, in 1921. After two years he returned to the United States for postgraduate work at Leland Stanford University. From 1925 to 1944 he was employed by Gulf Oil Corporation and its subsidiaries. Until 1938 he was engaged in geological work in Venezuela. Then he was made assistant manager of the Danish-American Prospecting Company in Copenhagan, Denmark, and served in that capacity until July, 1940. The following month he returned to Venezuela as executive assistant of the Mene Grande Oil Company in Caracas, a position he held for nearly four years. In 1945 he acted as consulting geologist for Socony- Vacuum Oil Company at Caracas, finishing this assignment in December last to accept his present post.

Iranian Production

CRUDE production in Iran for 1945 was 16,839,000 tons or approximately 117,873,000 barrels.

ALTHOUGH the first crude test drilled by Shell interests in the Oriente section of Ecuador was abandoned at a depth of approximately one mile drilling is to be continued in that area. It is reported that two rotary rigs capable of drilling to 10,000 feet are to be flown in and further tests made at sites already selected. In other districts International Petroleum is at work on two wells after abandoning Bajada No. 1 at 13,200 feet, the deepest drill hole ever sunk in that part of South America. Anglo-Ecuadorian and Ecuador oil fields also have several rotary rigs in operation.

Visiting Near East Properties

W. H. Farrand, of San Francisco, vice president of American Overseas Petroleum Company, is on a two months trip to Egypt and other points in the Near East. American Overseas is jointly owned by The Texas Company and Standard of California and is conducting exploratory operations in Near Eastern areas.

Salient Features of Recommended Guatemalan Petroleum Law

(*Continued from page 49*)

acceleration of the working of the concession. However, taxes, including royalty, cannot be changed.

(5) The holder of any type of concession is obligated to commence work with reasonable promptness and to prosecute it with reasonable diligence in accordance with accepted good practices. Non-compliance may bring fines or court action compelling compliance, but is not cause for the annullment of the concession.

(6) In no case shall foreign governments, or states or corporations dependent upon them, or foreign companies not legally domiciled in Guatemala, be permitted to acquire concessions in whole or in part.

(7) Holders of concessions are obligated to give preference to Guatemalan citizens in all types of employment within the country if they are duly qualified and are also obligated to maintain effective training programs. However the concessionaire cannot be hindered from using employees of his own selection in executive and technical work requiring specialized training or long experience.

Exploration Concessions:

(1) All persons legally competent to acquire concessions have the right to freely explore geologically or geophysically all lands except those under concession.

(2) Exploration concession lots shall not excell 50,000 hectares in area or be less than 10,000. The number of such concession lots, or total area, granted to a single concessionaire is discretionary with the State.

(3) Exploration concessions are for three years and the State can grant a renewal of one year for any part or all.

(4) The concessionaire may renounce all or any part of the concession at any time, although any remaining after renunciation cannot be less than 10,000 hectares.

(5) Holders of exploration concessions are required, under penalty of forfeiture, to spend on exploration work, including wells, 20 cents per hectare (approximately 10 cents per acre) per annum and must post a bond for this amount.

(6) The annual exploration tax is two cents for an hectare (approximately one cent per acre) per annum during the life of the concession. (This is not tax revenue but to defray costs of administering the petroleum law as it relates to exploration concessions.)

Exploitation Concessions:

(1) Holders of exploration concessions at any time during the life of the concession may select one or more parcels for exploitation and receive an exploitation concession. These parcels may be selected anywhere within the exploration lot or lots but the total area of such parcels cannot exceed one half of the area of such lot. The maximum area of an exploitation parcel shall not exceed 25,000 hectares (one-half the exploration maximum) and the minimum shall not be less than 1,000 hectare (1/10th the exploration minimum). The number and total area of exploitation concessions to any one concessionaire is discretionary with the State.

(2) The term of an exploitation concession shall be for 30 years and if the government desires to grant it anew the concessionaire has preferential right. Otherwise it reverts to the Nation without indemnity and including all permanent works.

(3) In the case of more than one exploitation application on the same area (other than obligatory concessions) the applicant will be notified and given 30 days in which to submit a revised application offering such special benefits to the Nation as the law permits. The Federal Executive has the discretion to accept any application which in its opinion best serves the national interest.

(4) Each holder of an exploitation concession shall pay throughout the life of such concession, an annual tax per hectare as follows: 1st five years $1.50; 2nd five years $3.00; 3rd five years $4.50; 4th five years $6.00; 5th five years $7.50; sixth five years $9.00. However, during any quarter the concessionaire may deduct a sum equal to the total royalty payment he makes on all exploitation parcels during the same quarter, provided the exemption applies only to amounts due for exploitation tax in excess of the rate of $1.50 per hectare per year.

Royalty:

(1) All exploitation concessionaire shall pay to the state a royalty equal to 12½ percent of petroleum produced, payable totally or in part in kind or in cash, at the election of the State.

(2) Value of the royalty oil paid for in cash shall be determined by the market value of the oil at the well. This market value will be determined by taking as a basis the average price of same quality oil in the governing market (such as U. S. Gulf Coast) to be specified by the regulations supplementing the law, and deducting the cost of transportation from the well to such market.

(3) Royalty cannot be increased or decreased during the life of the concession. However, the Federal Executive may reduce royalty, applying to a particular field, when it is proved the cost of production, including taxes and royalty, makes commercial production impossible but no such reduction can apply during the first five years of a parcel's exploitation.

Manufacturing: (Refining, processing or treating for market products)

(1) Manufacturing concessions are non-exclusive, in other words are permits.

(2) A manufacturing concessionaire has the preferential right to utilize his installations for manufacture of petroleum owned by him, but is obligated to utilize any remaining capacity for manufacture pro rata of such other petroleum as may be offered by others at non-disciminatory rates approved by the government. If the government wishes to take its royalty oil in kind to be manufactured it may require that its royalty oil be manufactured pro rata with that owned by the manufacturing concessionaire, up to the capacity of the installation; in all cases such government has priority over all other petroleum for the utilization of excess capacity.

(3) Manufacturing concessions are for 30 years with privilege of renewal for a like period. Upon termination of the concession at any time the government for 60 days has preferential right to purchase or to arrange to purchase by others of any part or all of property or rights.

(4) There shall be no special manufacturing taxes, but this does not exempt concessionaires from general Federal taxes or the products from domestic sales tax.

Pipe Lines:

(1) Pipe line concessions are non-exclusive and the provision for their duration the same as manufacturing concessions.

(2) The concessionaire's rights to utilization of his facilities are also the same as those for manufacturing concessions.

(3) No special transportation taxes shall be levied, but this does not exempt concessionaires from general federal taxes.

Import and Export Regulations and Miscellaneous:

(1) No exploitation concessionaire shall export from the country any petroleum until he has offered for sale within the country at market price his pro rata share of the amount sufficient to meet domestic requirement. This does not require him to refine the oil for domestic use.

(2) No export tax shall be levied upon petroleum produced within the the country.

(3) During the 10 years following the granting of any concession, the concessionaire may import free of customs duty, all equipment, machinery, material, instruments, supplies and accessories which are neither produced nor manufactured within the country and which are exclusively for concession work.

(4) No other special taxes or levies other than those provided for in the law can be applied to concessions; nor shall such concesions be subject to any municipal or other local taxes or levies. All concessionaires, however, shall be subject to such general federal taxes as are generally applied in addition to the ones provided for in this law.

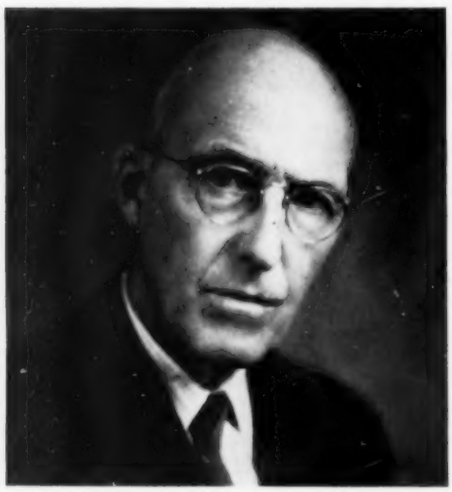
(5) Concessionaires are obligated to supply the government on request all data pertinent to a proper understanding of the development and condition of the petroleum industry of the country. In addition they must submit annual reports of the work they have performed during the preceding year.

(6) The sole causes of cancellation of concessions by the Federal Executive are: (a) of an exploitation concession, failure to exploit with reasonable diligence at least some part of the area under concession; or for failure to pay the annual surface tax within one year of its due date; (b) of a manufacturing or pipe line concession, failure to begin work within one year of issuance of concession; (c) of any concession, following its renunciation by the concessionaire in accordance with the law; or following expiration of its term including extensions; or for its acquisition in whole or in part by persons not eligible to receive such concession under the law. In all these cases, however, the concessionaires is given notification and reasonable opportunity to remedy the situation.

NEW YORK NOMADS OFFICERS FOR 1946

Seated — left to right: Val R. Wittich, regent; John H. Baird, president; David J. Muldoon, treasurer; William J. Campbell, regent.
Standing — left to right: James W. Reed, secretary; George W. Knight, ass't. sergeant-at-arms; Ben A. Hilliard, sergeant-at-arms; Edmund F. Gahan, ass't treasurer; Kenneth J. Langley, ass't secretary. Ralston M. Dinges, vice president, is not in the picture.

Oil Company Staff Changes



H. R. Straight

A. W. Ambrose

H. R. STRAIGHT has been elected chairman of the Cities Service Oil Co., (Del.) and A. W. Ambrose succeeds him as President. Similar action was taken by Empire Pipeline Co. Mr. Straight has headed these companies since their organization. Mr. Ambrose has seen service as executive vice president of both companies.

Mr. Straight was born at Tidioute, Pa., on Sept. 30, 1874. After graduating from Stanford University, he began his career in the oil industry with his father who was a prominent Pennsylvania operator. In 1911, he moved to Oklahoma where he was employed by the T. N. Barnsdall interests. The following year Henry L. Doherty acquired the company with which Mr. Straight was associated and he was made manager of the oil production properties.

Mr. Ambrose has been with Cities Service for the past 23 years in various executive positions. After working as a geologist and engineer in California and Texas, he joined the U. S. Bureau of Mines as Petroleum Technologist in 1918. Two years later, he moved to Bartlesville, Okla., as superintendent of the Petroleum experiment station there. He rose to the assistant directorship of the U. S. Bureau of Mines and, in April of 1923, was employed by Cities Service Oil Co., as manager of its land and geological activities. From 1925 to 1930 he served as manager of the oil production, land and geological divisions. His election as vice president and assistant general manager came in February of 1930. On August 1, 1941, he was elevated to the position of executive vice president and assistant general manager, the position he held until his election to the presidency. He also served an eight-year period as vice president of Cities Service Gas Co.

DIRECTORS of the M. W. Kellogg Company have elected M. W. Kellogg, chairman of the board, H. R. Austin, president, F. E. Johnson, vice chairman of the board, and L. H. Harvison, executive vice president. Creation of the two new executive positions of chairman and vice chairman of the board was necessitated by the company's proposed expanded program of industrial engineering, manufacturing, and process development. Petroleum engineering will continue to play a major part in the company's activities, and service to the other process industries which has increased markedly in recent years, will be still further developed.

The plans for widening the base of the Kellogg Company's operations in the immediate future also provide for extended study of the commercial possibilities of the new processes, equipment and materials developed in connection with Kellogg's work on the atom bomb project, at Oak Ridge, Tenn., as well as utilizing the metallurgical and fabricating advances achieved at the company's plant and laboratories at Jersey City.

H. R. Austin

The M. W. Kellogg Company was founded in 1905. It was operated as a privately owned enterprise until December 1944 when control of the company was purchased by Pullman, Inc. The present election marks the first major change in Kellogg executive personnel since the company was formed.

In the course of its career, the Kellogg Company has built oil refineries all over the United States and in many other parts of the world including Europe, Asia, Africa and Latin America. It is estimated that Kellogg's war job of refinery installations throughout this country and abroad in the war years between 1941 and 1945 represented an investment by the oil refining industry of close to a billion dollars.

HUGH W. FIELD, assistant manager of the research and development department of The Atlantic Refining Co., has been elected a director of the company.

Mr. Field became affiliated with Atlantic as a junior chemist in 1928. He was named assistant manager of research and development in 1940. During the war he was a member of or technical adviser to a number of government committees concerned with aviation gasoline.

DR. JAY V. BECK of the University of Idaho, Moscow, has arrived in Bradford to become microbiologist in the production laboratory of the Pennsylvania Grade Crude Oil Association. Dr. Beck will conduct the association's investigation of the potentialities of bacteria in relation to oil recovery. His work will be done in cooperation with the American Petroleum Institute and Dr. Claude E. ZoBell of the Scripps Institution of Oceanography, La Jolla, Calif.

L. H. Harrison

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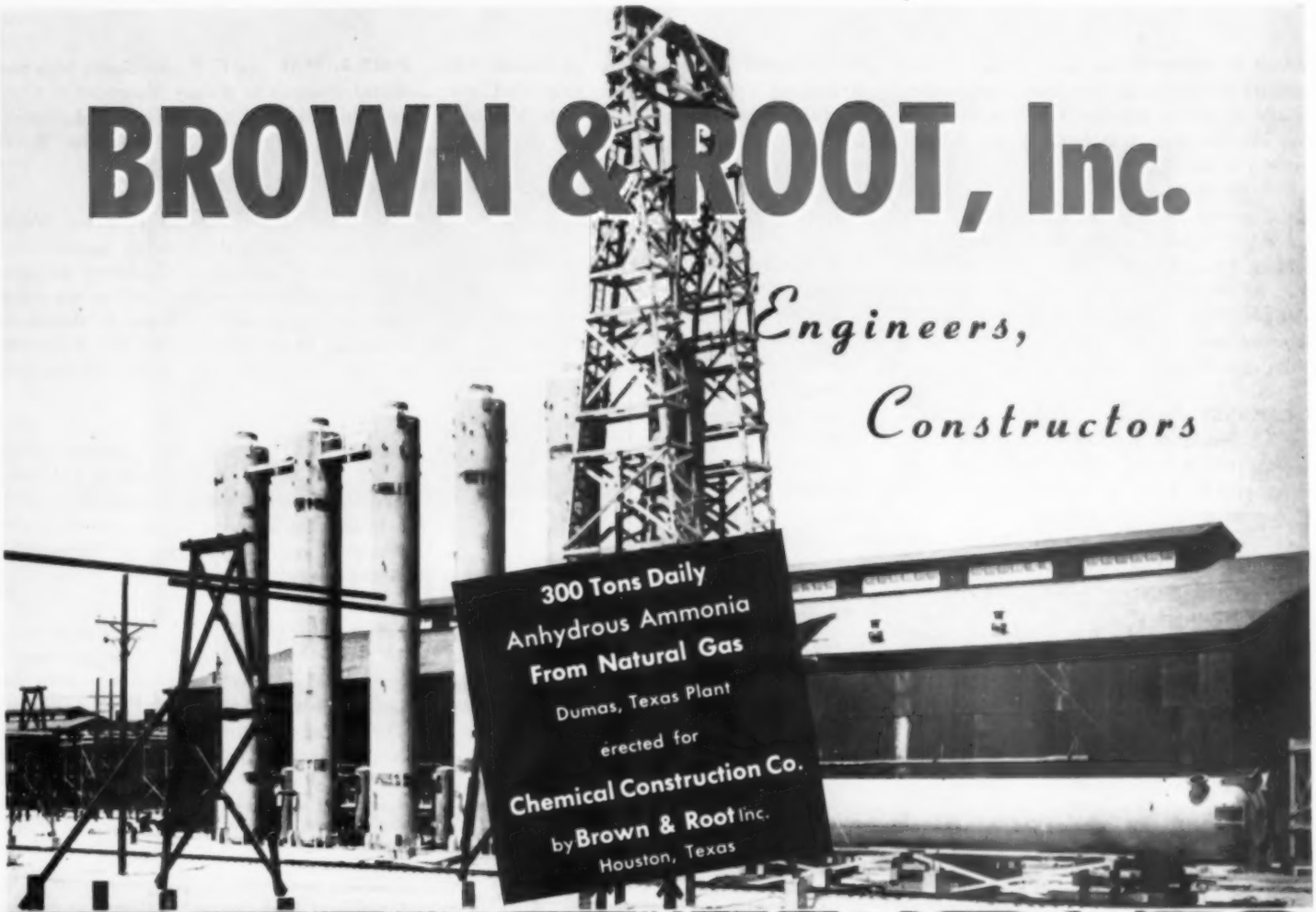

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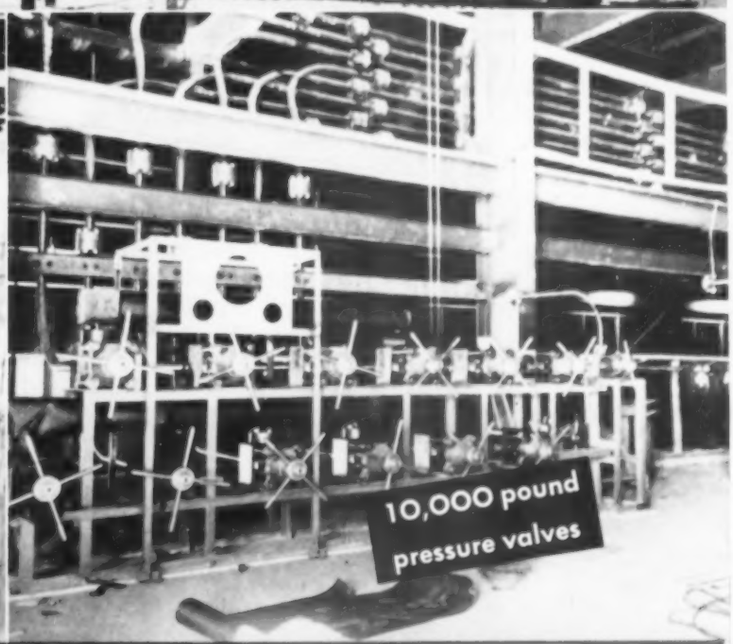

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★ GAS TREATING PLANTS ★ VAPOR RECOVERY PLANTS
★ FRACTIONATING AND TREATING OF REFINERY VAPORS
★ REFINERY UNITS ★ CHEMICAL PLANTS

ROGER H. SHERMAN has been elected a vice president of the Creole Petroleum Corporation, an affiliate of the Standard Oil Company (N. J.). Mr. Sherman was formerly an assistant manager of the company.

Mr. Sherman has been associated with Creole and other Standard companies for more than eighteen years. He has spent the last thirteen years in Venezuela directing Creole's geological activities. Prior to his service in Venezuela, Mr. Sherman spent several years in Mexico as a geologist with the Huasteca Petroleum Co.

C. E. FINNEY, JR. has been elected a vice president of Standard of California. He has been assistant vice president for manufacturing for the last year but will be concerned with industrial relations matters in his new position.

A graduate of Cornell, Finney joined Standard of California in 1919 at the Richmond refinery, after his return from the war. In 1931 he became manager of the El Paso refinery of Standard of Texas, a subsidiary, and a year and a half later was made manager of the Richmond refinery. Three years ago he became manager of the manufacturing department.

Two other new appointments in Standard of California's manufacturing department are G. H. Langsdorf as manager, technical services, and O. N. Miller, assistant to G. A. Davidson, vice president in charge of manufacturing. Miller formerly was superintendent of the cracking division at El Segundo refinery.

BYRON B. LOOMIS was promoted to personnel and public relations manager of the Colonial Beacon Oil Company upon his recent return from nearly five years with the United States Navy, it was announced recently by Mr. F. H. Skehan, vice-president of the company. Mr. Loomis entered the company in 1933 and was sales engineer for the Albany (N.Y.) district when he was called to active duty.

W. T. DABBS is superintendent of Humble Oil & Refining Company's recently established new Hub district headquarters in Columbia, Mississippi. B. H. C. Stover is district chief clerk. Both were transferred from similar positions with Humble at Eucutta District headquarters at Waynesboro, Mississippi.

S. E. Wallette, formerly farm boss at Humble's Bayou Sale District, Franklin, Louisiana, has been made district superintendent of the Eucutta District, and J. M. Barber has been transferred from district chief clerk at Heyser Gas Plant in the Production Department's Southwest Texas Division to district chief clerk in the Eucutta district.

DR. HENRY SONNEBORN III, until recently on active duty as a lieutenant in the Navy, and Dr. Hans Schindler, research chemist, have joined the technical staff of the Petrolia, Pa., refinery of L. Sonneborn Sons, Inc.

Dr. Sonneborn returns to the company as assistant to Dr. F. W. Breth, vice-president and technical director. Dr. Schindler, who joins the company as a research chemist, formerly was senior research chemist for Pure Oil Co. He recently served as a member of the Technical Oil Mission which investigated the German petroleum industry.

M. L. MARGENAU has been appointed director of public relations for Cities Service Oil Co. to succeed the late R. J. Daugherty. A longtime employee of Cities Service, Margenau comes to the public relations department with a wide variety of experience in the public utility and oil industries. His work in these two fields includes public and employee relations, house magazine editing, advertising and publicity, valuation of utility, pipeline and oil industry properties, rate studies, engineerinng and managerial positions. He has assumed high civic responsibilities in the cities and states in which he has served the company.

JOHN F. SEAL and C. Francis Beatty have been elected directors of Socony Vacuum Oil Company, Inc. Mr. Seal is the newly elected treasurer succeeding Arthur T. Roberts who retired December 31.

Mr. Beatty will assist Vice President Walter L. Faust in the management of Socony's combined eastern and central marketing divisions. The two divisions were combined on the retirement of vice president Charles E. Arnott on December 31 and placed under Mr. Faust who has been in charge of the eastern division since 1938.

C. W. GENTRY has been made assistant manager of railway sales for Continental Oil Company, with headquarters at Chicago. He succeeds E. F. Shannon, who was recently promoted from assistant manager to manager of Continental's railway sales division.

DON R. KNOWLTON, who resigned as executive vice-president and manager of the foreign department of Phillips Petroleum Company, has entered into a partnership with Frank M. Porter of Fain-Porter Drilling Company, Oklahoma City. The new firm will engage in drilling contracting and will establish a consulting petroleum engineering service after making a survey of the industry to determine needs of the various phases.

Knowlton is a pioneer in petroleum engineering. A native of Iowa, he took a degree in geology from the University of Colorado and worked in Wyoming, Kansas, Oklahoma and Texas. He served Marland Oil Co. as a petroleum engineer and joined Phillips in 1926, becoming assistant chief engineer in 1931, later being promoted to chief engineer, general superintendent and production manager. Shortly after Pearl Harbor he was called to Washington to become director of production for PAW. In June 1944 he returned to Phillips, taking charge of the new foreign activity.

Byron B. Loomis

M. L. Margenau

Don R. Knowlton

ANSWER

A reconnaissance method that is fast and economical.

QUESTION

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ANSWER

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Productivity Index of seven major industries in comparison with averages for "All Manufacturing" (from Bureau of Labor statistics)

	1919	1925	1931	1937	1938	1939	1940	1941	1946
All manufacturing	58.0	86.0	107.3	119.6	121.8	132.4	138.8	142.7	?
Cement	60.2	86.0	119.4	124.5	128.7	139.4	138.0	149.8	?
Chemicals	41.5	71.0	112.7	126.6	124.3	138.7	133.0	*	?
Cotton Goods	85.0	96.3	94.0	136.6	137.0	146.1	155.6	161.6	?
Automobiles	42.7	74.2	94.6	119.3	118.4	118.8	120.4	*	?
Lumber and Timber Products	95.8	92.8	109.9	100.0	106.2	121.3	129.0	133.3	?
Petroleum Refining	49.4	93.2	116.7	167.1	177.3	193.4	200.0	207.6	?
Tobacco Products	68.1	83.6	112.1	145.2	152.8	161.9	162.3	166.7	?

* *Figures not available*

"Where do we go from here?"

It is not surprising that the petroleum refining industry has an outstanding record in increasing efficiency, reducing production costs, and improving product quality, for this industry has consistently made the greatest use of all available engineering assistance.

The post-war resumption of tooth-and-nail competition means a spirited continuance of technological advancements.

For the race of the future it behooves every concern, in every field, to make use of the newest methods, latest processes and most advanced engineering—particularly in the face of rising labor and other costs.

It is largely on the development of improved and more efficient processing methods and plant designs that the Badger business is founded. Badger has an impressive record of achievement in helping many chemical, petroleum and petro-chemical companies—especially in continuous, large-unit production, as well as in design for higher quality products.

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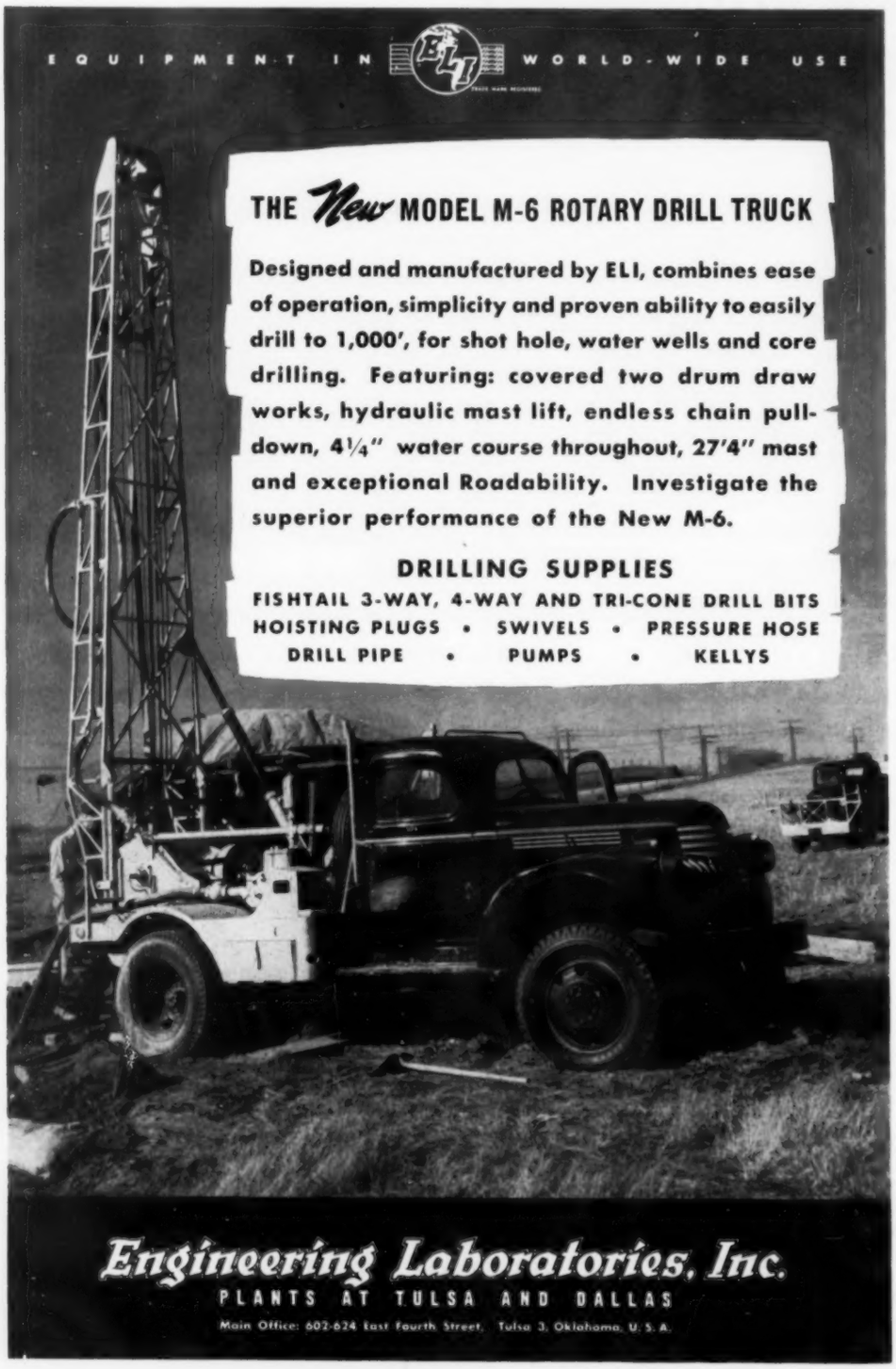
HEMICAL AND CHEMICAL INDUSTRIES

LICENSING AGENTS FOR THE TCC PROCESS AND THE HOUDRY CATALYTIC CRACKING PROCESSES

GORDON LOUD has been appointed Middle East representative of Atlantic Refining Co. with headquarters in Cairo, Egypt. Mr. Loud, an archeologist of many years experience, joined the Company last February 6 and is now en route to Naples and Alexandria with his family to begin a survey of petroleum activities in the turbulent oil situation in the Middle East.

In the season of 1928 and 1929 he was a field archeologist on an expedition for the University of Michigan in Egypt. From 1929 until 1942 he was on a similar expedition for the University of Chicago in Egypt, Iraq and Palestine.

RAYMOND W. PARKER has been appointed chief engineer of Standard of California's manufacturing department. During the war Parker as assistant chief engineer handled the engineering phase of all the major refinery construction projects for Standard's manufacturing department. Previous to 1933 he had worked in the engineering department at both El Segundo and Richmond refineries.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THE New MODEL M-6 ROTARY DRILL TRUCK
Designed and manufactured by ELI, combines ease of operation, simplicity and proven ability to easily drill to 1,000', for shot hole, water wells and core drilling. Featuring: covered two drum draw works, hydraulic mast lift, endless chain pull-down, 4¼" water course throughout, 27'4" mast and exceptional Roadability. Investigate the superior performance of the New M-6.
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New Engineering Company

FORMATION of the Catalytic Engineering and Construction Co. to engage in the design and construction of oil refineries and oil refinery equipment was announced today by T. Ellwood Webster, of Rosemont, Pa., president of the new company. Mr. Webster, formerly assistant to the president of Sun Oil Co., said the new company would specialize in the design and construction of catalytic refinery units employing processes licensed by the Houdry Process Corp. of both the fixed-bed and Thermofor moving-bed types.

T. Ellwood Webster Alan T. Knight

Alan T. Knight, of Claymont, Del., formerly manager of maintenance and construction at Sun Oil Company's Marcus Hook refinery, is vice president of the new company. Directors are Mr. Webster; Mr. Knight; Arthur E. Pew, Jr.; vice president of Sun Oil Company in charge of manufacturing and research; Clarence H. Thayer, chief engineer and a director of Sun Oil Company; Robert G. Dunlop, comptroller and a director of Sun Oil Company. Headquarters of the new company will be located at 1608 Walnut Street, Philadelphia, Pa.

Heads Chiksan Eastern Exports

ED T. LANDGRAFF has been named eastern representative of Chiksan Export Co. He will handle New York domestic sales for Chiksan. Mr. Landgraff has been with Oil Well Engineering Co. for 20 years. Roy W. Sexton continues in the New York offices at 50 Church St. selling in the industrial markets.

DONALD B. THURMAN, former Lieutenant Colonel with the AAF in the China-Burma-India theater, has joined the marketing council department of Standard Oil Company (New Jersey). He will assist in the coordination of marketing procedures and advertising programs of foreign and domestic affiliates of the company.

Mr. Thurman previously served as public relations officer at the United States Military Academy and public relations aide to General Dwight D. Eisenhower, then chief of staff of the Third Army. He entered military service in 1940 from the J. C. Penney stores where he was in the advertising-marketing-sales promotion department.

THE FIRST SMITHway pressure vessel established, in 1925, an electric arc-welded construction that overcame the most serious industrial hazards ever known in the petroleum industry.

In 1925, the First . . . in 1946, the Largest

SUSTAINED WELDING RESEARCH for the past 21 years makes possible today this single-piece, 160-foot, 446,000-pound SMITHway deisobutanizing tower. Now in service, it is producing 652,000 gallons of butane per day.

SMITHway Pressure Vessels

Freedom in size, freedom in design, greater safety, lower cost—these are the great advantages of SMITHway welded vessel construction.

In every corner of the earth—India to Texas, Iran to Curaçao—SMITHway vessels are demonstrating daily that they are safe, dependable, unfailing.

A. O. Smith has built the majority of all high-pressure oil-processing vessels in use today, yet SMITHway welded vessels are also serving in large numbers the chemical, food, and paper industries.

The sum of SMITHway research is at your service, on request.

Other Famous SMITHway Products

Heat Exchangers • Oil Well Casing • Meters for Petroleum Products • Large-Diameter Pipe • Centrifugal Pumps • Electrodes and Welding Equipment • Penstocks • Automotive Chassis Frames • Glass-Lined Tanks • Electric Motors • Blowers • Domestic Stokers and Water Heaters • Electric Hand Tools

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STONEWALL JACKSON WARNER, JR., who recently returned to Ethyl Corporation, after three years as a petroleum officer with the Quartermaster Corps in Europe with the rank of Lieutenant Colonel, has been appointed assistant manager of Ethyl's Atlanta division. He received the Bronze Star, the Croix de Guerre, and the Member of the British Empire Decoration for his war services. As POL offices he supervised design and construction of field storage depots for petroleum products in England and France, and supervised the fueling of U. S. Army ground and air units in their final sweep across France into Germany.

R. C. BROWN has been appointed assistant to J. C. Johnston, manager of Continental Oil department. Mr. Brown has been with Continental and its predecessor Mutual Oil Company since 1924. He will be transferred from Ponca City to Denver.

SAMUEL K. BOTSFORD and Peter C. Jensen have been appointed assistant secretaries of Standard Oil Company (Indiana). They fill vacancies created by the promotion some time ago of L. E. Harmon to secretary and by the recent death of W. C. Ewald.

Mr. Botsford joined the company in 1920. He became assistant to the assistant secretary in 1936 and administrative secretary in 1945. Mr. Jensen joined the company in 1925 in the general office sales accounting department, where he was a specialist in tax matters. He became assistant to the secretary in 1945.

RICHARD H. WHERRY, formerly assistant to the chief engineer of Skelly Oil Company's liquefied gas division, has been appointed chief engineer of the LPG division of the Weatherhead Co., Cleveland.

H. T. Ashton

Ashton Heads Western Refiners

AT the annual meeting of the Western Petroleum Refiners' Association, held in Fort Worth, Texas, H. T. Ashton of St. Louis, general manager of the Lubrite division of Socony-Vacuum Oil Co. was elected president for the ensuing year. He succeeds C. L. Henderson who had served six successive terms as head of the organization.

Mr. Ashton has long been active in the affairs of the Association having been a member of the board of directors since 1918 and occupying various official positions including a term as executive vice president. He has a broad acquaintanceship in the industry and is recognized as one of its most experienced and capable operating men.

Other officers elected at the meeting were R. W. McDowell, Mid-Continent Petroleum Corporation, T. M. Martin, Lion Oil Refining Company, R. L. Tollett, Cosden Petroleum Corporation, and T. A. Helling, El Dorado Refining Company, vice presidents; J. C. Day, Secretary.

C. E. SHEPARD, manager of the Atlanta sales division for Gulf Oil Corp., retired April 1 after 35 years with the company. He was succeeded by his former assistant G. E. Millican. H. G. Russell stepped up to the assistant managership.

At the same time C. H. Dougal retired as manager of the Pittsburgh sales division and was succeeded by G. F. Hunaker. His assistant will be C. C. Gunst.

Annual Index Published

AN index to all 1945 issues of World Petroleum has been prepared in handy pamphlet form. Copies are available to subscribers on request and without charge. Requests should be sent to general office at 2 West 45th Street, New York, 19, New York.

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as applied to
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5'-0" & 6'-0" DIA. x 72'-0" TOTAL LENGTH

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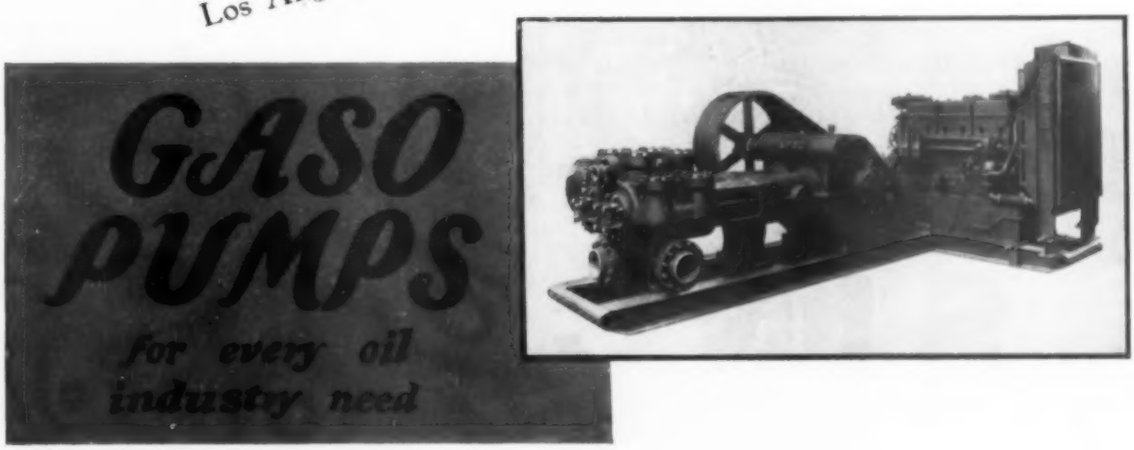
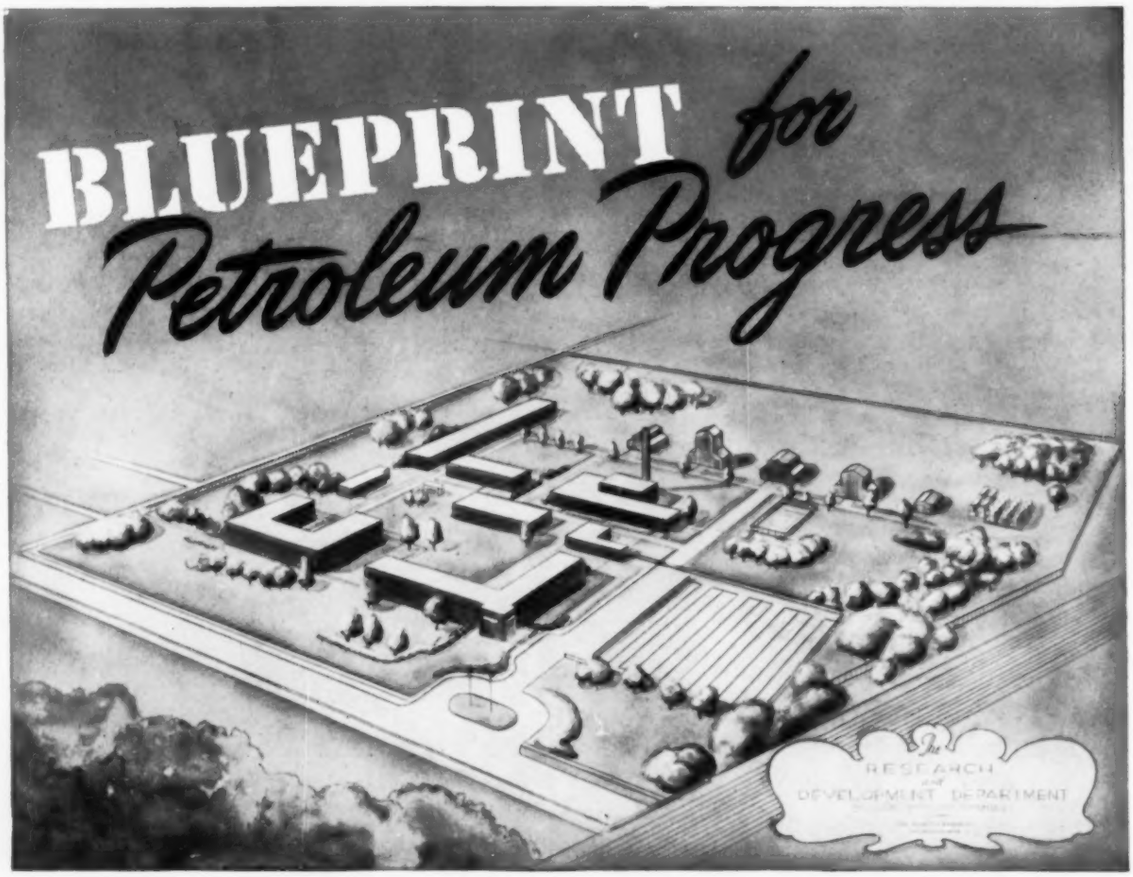
In its class, Gaso offers the world's most *comprehensive* line of pumps, and that's important to any operator who insists on maximum results. In nearly 30 years' service to the oil industry, Gaso engineers have encountered every type of condition—and unhesitatingly designed models and sizes to meet every requirement... As a result, you don't have to fit your conditions to the pump when you specify a Gaso, because in the Gaso line you will find a model that exactly fits your conditions . . . Gaso Pump and Burner Mfg. Co., 902 East First St., Tulsa, Oklahoma. Export Office: 149 Broadway, New York. Shreveport: W. L. Somner Co., 419 Lake Street. Los Angeles: Production Equipment Co., 651-653 E. Gage Ave.





With the return of peace, the petroleum industry moves forward once again toward the development of new and improved products. To keep pace with ever-increasing demands on the industry, Sinclair is building an elaborate new research center at Harvey, Ill., where recognized technological experts will continue to maintain Sinclair's position with the leaders in petroleum progress.

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The number of drums turned out by MOON Machines during the past six years is phenomenal and they range from Jerry cans to large drums for road surfacing compounds. The general efficiency and strength of the finished product, and the speed of operation, which is a certainty with MOON Machines, alone could cope with the demand.

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We have installed complete plants in many parts of the world during the last 30 years and are experts at the job. In addition, we make a wide range of machines for other types of metal containers, boxes, bungs, caps, etc. If you are interested send for our catalogue; it is available on request.

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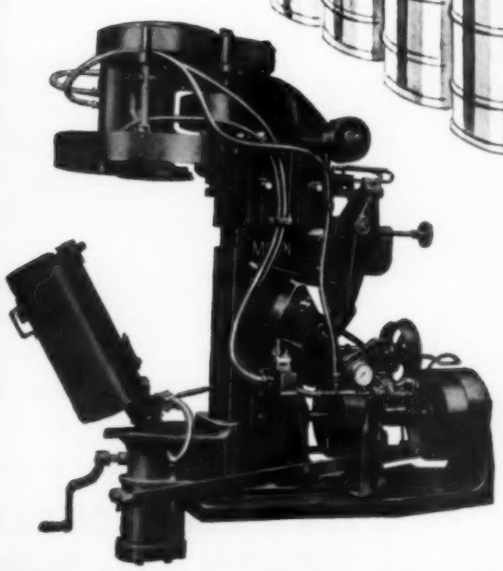

Single-Ended Automatic Drum Double Seaming Machine arranged for seaming Flush Top Drums, and equipped with Air-Operated Chuck Guard and Air-Operated Clamp: the Clamp being interlocked with the Guard.

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Adamson-Alco Affiliation

THE DANIEL ADAMSON & CO., LTD. of Dukinfield, Cheshire, England, will manufacture the complete heat transfer equipment line of the Alco Products Division, American Locomotive Co. Under the terms of the affiliation, the English company, which has over 103 years of experience in the manufacture of Turbo Plant boilers of all types, including shell and similar equipment, will establish a division to produce Alco Products equipment. In making the announcement, Mr. McColl said that the Alco Products Division of American Locomotive will do all engineering and designing.

To Build New Lube Plant

THE SHELL OIL COMPANY, INC., will begin construction immediately on the first complete lubricating oil manufacturing plant to be built since V-J Day, P. E. Foster manager of the Houston refinery of the company, announced. The plant will be located adjacent to Shell's present refinery on the Houston Ship Canal and will cover 75 acres of land in the 650-acre tract purchased last year to provide for post-war expansion.

The new lube plant will be in addition to an extensive construction project now under way at Houston which includes a 17,000 barrel catalytic unit, gas recovery and treating equipment. Included in the installation will be plants for vacuum distillation, deasphalting, solvent extraction, dewaxing and chemical treating.

The construction plans include also a number of pilot plants for research.

To Buy Seven Planes

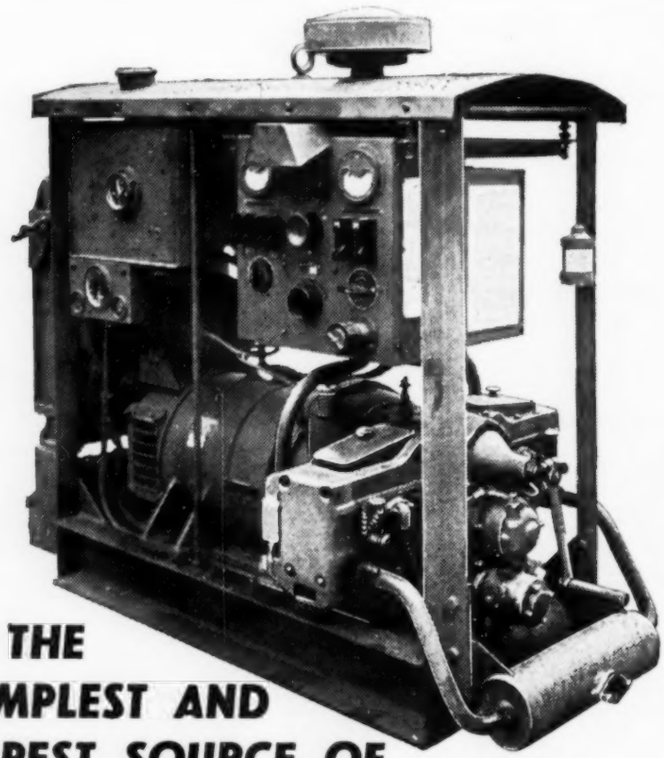
A FLEET of seven new airplanes will be used by Standard Oil Company (Indiana) in transacting company business. Two planes have been delivered, two more have been purchased, and three others will be bought in the near future.

Largest of the new planes will be a Lockheed Loadstar and Beechcraft. The Lockheed will accommodate 10 passengers and two pilots, while the Beechcraft will have accommodations for four passengers and two pilots.

The five other planes will be conventional light models of popular make for use by members of Standard of Indiana's recently expanded aviation of sales department.

Western Representative

ARNE ERIKSEN has been appointed western representative of both the gas processes division and the votator division of the Girdler Corp. with headquarters in the Russ Building, San Francisco. Mr Eriksen was chief operating engineer prior to his assignment to the West Coast.

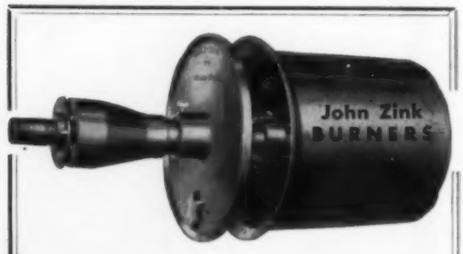


THE SIMPLEST AND CHEAPEST SOURCE OF 8-12 b.h.p. IS A

CUB DIESEL

The horizontal design of the "CUB" diesel gives inherent balance. It is a high-speed low-weight engine of 1006 c.c. capacity with a continuous heavy duty rating of 12 b.h.p. at 1,800 r.p.m. The "CUB" will start from cold, it will give good service for many years with practically no attention and uses very little fuel.

OIL ENGINES (COVENTRY) LTD.
Atlantic Works, Harefield Road, Coventry



For: Power Boilers — Gasoline Plant Boilers — Treating Furnaces — Industrial Boilers — Heating Boilers — Domestic Furnaces

Refinery Stills and Furnaces

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"JOHN ZINK PRODUCTS MUST BE GOOD"

JOHN ZINK COMPANY

4401 South Peoria Tulsa, Oklahoma

Life insurance? Naw — this is a RHEEM drum

THE MARKET for "over-Niagara" barrels hasn't expanded much. But the variety of other jobs handled by Rheem steel shipping containers is surprising.

Once thought suitable for packaging only petroleum products and paints, these steel drums are now used by almost every branch of industry. Chemical plants, for example, use them for shipping volatile, toxic, and corrosive liquids. Food processors rely on specially lined drums to protect such fragile-flavored products as shortening and salad oils. During the war, steel drums proved the perfect container for overseas shipment of airplane engine parts. Packed with silica gel and hermetically sealed in the drums, these delicately machined parts were safe from damage by rough handling, moisture, and dust . . . arrived ready for instant use.

Inside and out, no other container protects like the flash-welded steel drum. And Rheem, with 20 years experience, knows how to adapt the steel drum to any practical purposes. Rheem steel containers are made by a nationwide network of plants . . . include a variety of sizes, closures, gauges, and linings. Find out from the nearest Rheem office how they can serve you.

ADDING SINEWS TO STEEL. Here is the secret of super-strength in Rheem drums—flash welding which joins a curled sheet of steel into the rugged drum body

RHEEM
MANUFACTURING COMPANY

Sales Offices
New York • San Francisco • Los Angeles

CONTAINER PLANTS
Bayonne, N. J. • Sparrows Point, Md. • New Orleans, La.
Houston, Tex. • Chicago, Ill. • Richmond, Calif.
South Gate, Calif. • Portland, Ore.

CHARLES G. SLOAN, JR., formerly automotive products sales manager for the New York department of Tide Water Associated Oil Company, has been named accessories sales manager for the company's eastern operating division. He has initiated an aggressive sales training and merchandising policy for new Tide Water Associated accessories.

DONALD P. KROTZ has been appointed assistant to the president of the California Research Corporation, Standard of California subsidiary. Following graduation from Stanford University as a chemical engineer, he joined Standard at the Richmond Refinery. After 12 years in engineering, maintenance, and distillation operations there, Krotz in 1938 was transferred to Standard's department on organization in the San Francisco home office.

J. EDGAR PEW, Sun Oil Company, Philadelphia, has resigned as chairman of the American Petroleum Institute's committee on petroleum reserves. Frederick H. Lahee, Dallas, Texas, chief geologist for Sun, will succeed Mr. Pew in the chairmanship.

"I deeply regret not having Mr. Pew continue on this job in which he has been such a fine chairman over the years and in which he has made a great contribution to the oil industry's reserve picture. He has given yeoman service to this important phase of API activity," President W. R. Boyd, Jr., said.

Mr. Pew has been chairman of the committee since its inception in the fall of 1936, when it was formed to survey annually the nation's proved petroleum reserves. The report has been issued annually since January 1, 1937.

W. C. Lane

W. C. LANE, president of the California Commercial company, a Standard of California subsidiary with headquarters in New York City, has been made assistant manager of Standard's foreign trade department at San Francisco. Lane has served as president of California Commercial Company from 1941 to 1943, and since his discharge from the Navy last December.

During the war Lane rose to the rank of lieutenant-commander, and at the time of his discharge was stationed in London as Officer-in-charge, Fuel and Tanker Control Section, U. S. Naval Forces in Europe, and as Deputy Chief Petroleum Officer of the Area Petroleum Service. Before going to Europe he was on the staff of the Army-Navy Petroleum Board in Washington.

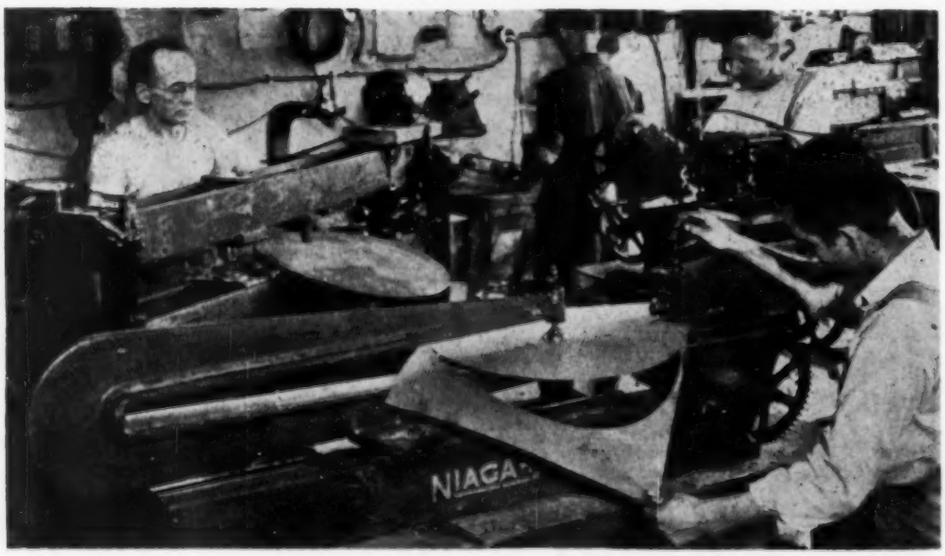
Heads National Supply Sales Promotion

GEORGE B. CUSHING has been named manager of sales promotion for the National Supply Co. He will direct the sales promotion activities of Spang-Chelfant, Superior engine and oil field machinery and equipment divisions of National Supply. A. P. Colby will continue as the company's advertising manager.

For Craftsmanship in GASKETS *for EVERY Job!*

Call—
STEVENS
4-3072 Tulsa

A blown gasket means an idle machine, eliminate production stoppage, save costly shutdown time with STEVENS Precision-Built Gaskets — in use wherever oil is produced, they are the vital seal for maximum performance. 33 Years Experience in Insulating, Gaskets and Packing Material go into every STEVENS job.



Gaskets of Copper, Aluminum or other metals.
All types of Rubber Gaskets.
We can build any size or type gasket—
you furnish the drawing or template.

STEVENS Ring Type Cylinder Head Gaskets. Guaranteed not to blow-out or cylinder head gasket made for any gas burn-out under high pressure. The best engine your money can buy — not a critical material.

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GASKET MANUFACTURERS AND INSULATING CONTRACTORS
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LADISH Forged Steel Fittings Assure

Reliability

1
Chamfers accurately machined for thread protection and easy thread engagement.
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Smooth bored for minimum resistance to flow.
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Uniform wall thickness achieved by precision machining provides maximum safety factor.
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Wide reinforcing bands and controlled grain flow provide maximum strength and fatigue resistance.
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Sharp, clean threads, machined to exacting tolerances of A.N.P.T. Stds., assure pressure-tight joints.
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Socket-welding types have deep sockets that assure rapid, accurate, self-aligning make-up.

Quality of Ladish Forged Steel Fittings is closely guarded by rigid metallurgical controls at every step in manufacture. Ladish specialized knowledge and skill make available to you Controlled Quality Fittings that assure dependable performance and ultimate economy.

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FITTINGS DIVISION

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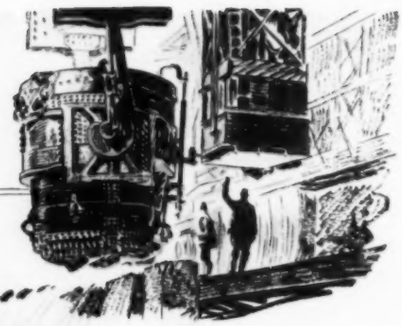
TO MARK PROGRESS

Youngstown to SAUDI ARABIA



SPEAK of undeveloped oil and the eyes of the world focus on the Near East. Four Western Countries control the oil rights in this area touching the Persian Gulf in which are located large proven petroleum reserves.

American oil companies own about 40% of the concessions. With interests in Iraq, Kuwait, Saudi Arabia, Bahrein Island, and Qatar, they are beginning to tap these vast resources. Only a beginning has been made. Present daily production in American operations is running less than that of the state of Kansas.

Youngstown Oil Country Tubular Goods is playing a part in the drama of this modern Arabian Night Entertainment--just as it has done in every oil-producing state and every other oil-producing area of the world. Wherever men find oil and are faced with problems of transporting materials for many thousands of miles to produce it only the best is acceptable. There they also find the orange-banded pipe from Youngstown, dependable for every need.

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

GENERAL OFFICES - YOUNGSTOWN 1, OHIO

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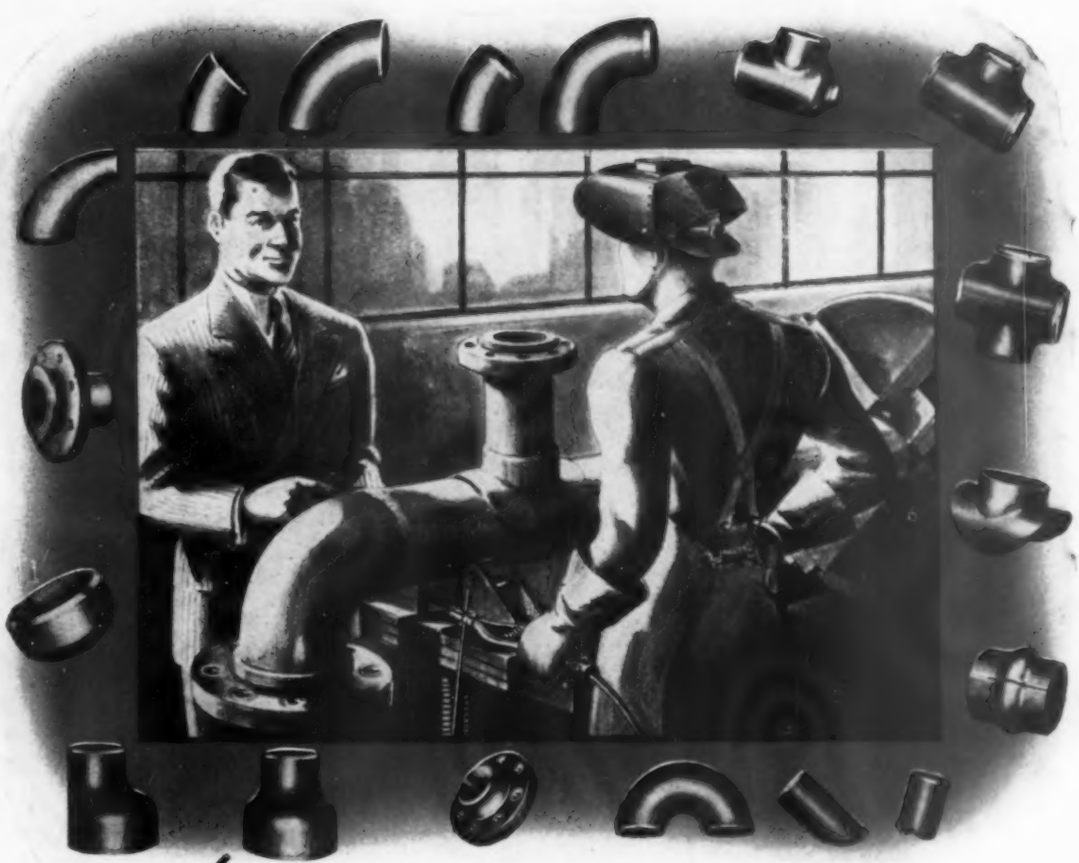
Manufacturers of

CARBON - ALLOY AND YOLOY STEELS

Pipe and Tubular Products - Sheets - Plates - Conduit - Bars - Coke Tin Plate - Electrolytic Tin Plate - Rods - Wire - Tie Plates and Spikes.

Youngstown is identified by the orange band or bands



Ask THE WELDER OF PRESSURE PIPING

what he thinks of

MIDWEST WELDING FITTINGS

You will find that he gives them hearty approval. Piping welders generally have a high appreciation of the exceptional dimensional accuracy and uniformity of Midwest Welding Fittings . . . their job is easier and they can turn out better work faster.

Midwest Welding Fittings have extraordinary dimensional accuracy because particular precautions are taken in their manufacture. Midwest Welding Elbows, for example, are made slightly oversized, then reheated to forging temperature and given a final accurate sizing in compression. This provides accurate dimensions, true circular section, and uniform wall thickness. Comparative corrosion tests as well as tensile and ductility tests have proved the beneficial effect of forging the metal in compression.

Welders also appreciate the wide variety of Midwest Welding Fittings . . . including "Long Tangent" elbows and reducing elbows. There is a fitting for practically every condition he encounters. Ask the local distributor or our nearest office for Bulletin WF-41.

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PIPING & SUPPLY COMPANY, INC.

Main Office: 1450 South Second St., St. Louis 4, Mo.

Sales Offices: New York 7—30 Church St. • Chicago 3—645 Marquette Bldg. • Los Angeles 33—820 Anderson St. • Houston 3—329 Shell Bldg. • Tulsa 3—533 Mayo Bldg. • Atlanta 3—Rhodes-Haverty Bldg. • South Boston 27—436 First St. • Distributors in Many Cities

EUGENE F. McCABE has been appointed general sales manager of the eastern division of Tide Water Associated Oil Co. He succeeds R. E. Ryerson who resigned because of ill health. Three new assistants were appointed. They are R. D. Rogers, William S. Whelan and Dartley E. Hoffman, who,with Dr. L. W. Parsons, export sales manager, will serve as members of the eastern sales committee. Mr. Rogers will be in charge of industrial and fuel oil sales as well as sales engineering and office management.

Frank J. Weess succeeds Mr. Whelan as New England manager with Boston headquarters. Charles G. Sloan becomes ascessory sales manager and Rush F. Carrier succeeds Mr. McCabe as New York sales manager.

CHARLES D. HAWLEY has been appointed assistant to the general manager of Ethyl Corporation research laboratories at Detroit. John B. Taylor, Jr. has been named to succeed Mr. Hawley as assistant director of engineering research.

Both appointments, as well as those of Earl Bartholomew a general manager of research laboratories, John B. Macauley as director of engineering research, and Robert V. Korley as director or aeronautical research announced recently, are part of a reorganization plan designed to increase the effectiveness of Ethyl's research laboratories in their postwar cooperative research with the petroleum and automotive industries.

Mr. Hawley taught mechanical engineering at Harvard before joining Ethyl in 1927 as an engineer in the Yonkers, N. Y. laboratories. When the laboratories were moved to Detroit a year later he became assistant director of engineering research.

Mr. Taylor became associated with Ethyl fifteen years ago as an engineer with the Baltimore division and since 1939 has been a member of the staff of the engineering research laboratories.

LT. COL. HAROLD N. HILL has been appointed manager of railways sales for Gulf Oil Corporation. Joining Gulf in 1934, Col. Hill became industrial lubrication service engineer handling railway sales for the Atlanta division. He entered the Army as first lieutenant, rising to officer in charge of production of the Birmingham Ordnance District, and then to assistant to the district chief.

MISS ALICE C. BARTLES, who has been named assistant secretary of Standard Oil Development Co., is the third woman to become a corporate officer in the Jersey group within the past six months. Previously, Miss Muriel E. Reynolds and Mrs. Margery M. Porter were appointed assistant secretaries of the parent company.

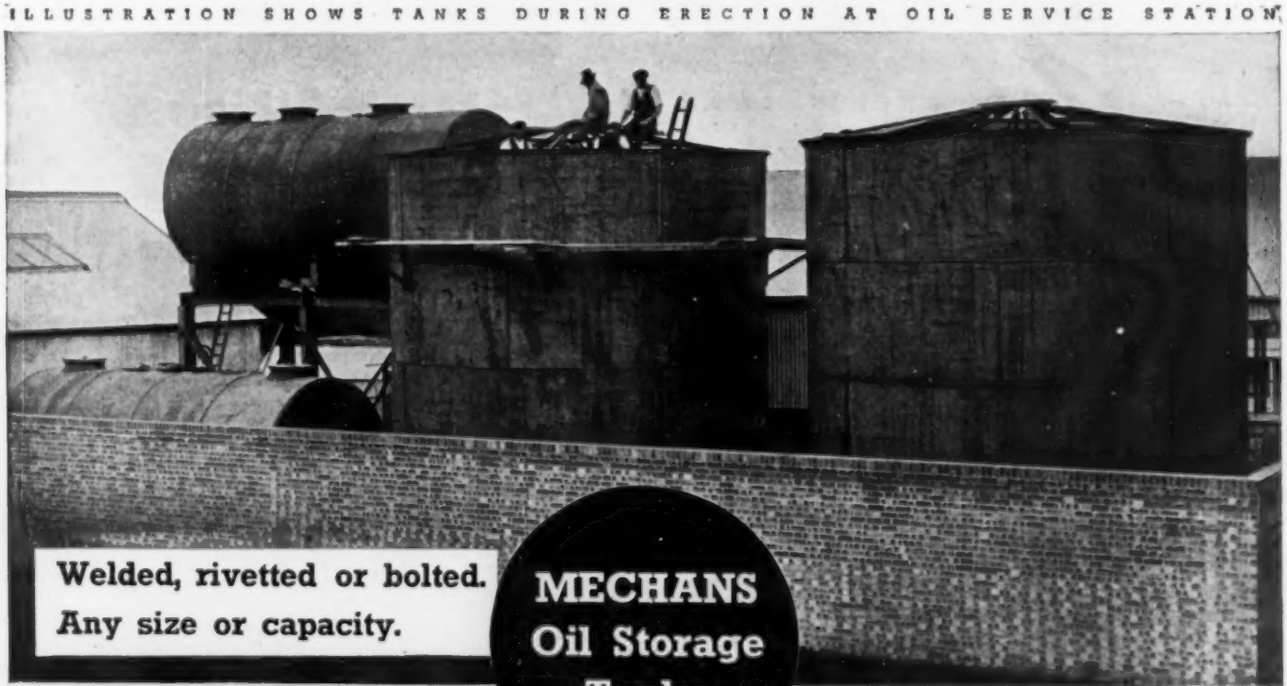
C. R. ALLEN has been named proration engineer of the Continental Oil Co., succeeding R. Van A. Mills who has retired. Allen joined Continental in 1919, following his war service. He has served as superintendent in several areas and was division superintendent in the Illinois-Indiana field at the time of his recent advancement.

Mills was with the U. S. Bureau of Mines for 10 years and later an editor of the Oil and Gas Journal. He joined Hudson's Bay Co. in 1929 as vice president and general manager and was transferred to Ponca City in 1932.

NORMAN J. McGAW has been appointed a general vice president of Shell Oil Company, Inc. for territory east of the Rocky Mountains. Mr. McGaw jointed Shell in 1925 and was named vice president in charge of Transportation and Supplies in 1939. This activity now will be directed by D. B. Hodges, general manager of the department.

CHARLES M. CROSS, geologist for Tide Water Associated Oil Company, San Francisco, recently returned to his former position with the company after four years in the Army. Lt. Colonel Cross participated in the battles of Normandy, Northern France, Rhineland, and Central Europe. He is a wearer of the Bronze Star and Croix de Guerre.

ILLUSTRATION SHOWS TANKS DURING ERECTION AT OIL SERVICE STATION



Welded, rivetted or bolted.
Any size or capacity.

MECHANS Oil Storage Tanks

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TELEGRAMS: "ELONGATION, LONDON" LONDON: 10, PRINCES STREET, WESTMINSTER, S.W.1 TELEPHONE: WHITEHALL 4288

HERE'S MUD IN SIGHT...

...BUT NOT IN YOUR EYE!

Yes Sir!...

**For clean pipe,
For clean floors,
and uncut mud, it's a
Patterson-Ballagh *Window Style* Pipe Wiper**

Yes Sir! Keep the mud in the hole, where it belongs. Keep it off the floor, and the crew.

Patterson-Ballagh's large 19" Pipe Wiper has a steel ring completely covered by rubber giving you plenty of strength plus the positive wiping effect of soft rubber. Its three windows are partly molded into the center web, and may be cut out on the job in case you want to watch the mud level.

No mud cutting with wash water...
Less mud rebuilding...
Less mud weight material loss...
Saves mud!!!...

Yes Sir! A Patterson-Ballagh window style Pipe Wiper will help you keep your mud in sight and under control.

This is a Pipe Wiper Guide Cone used to guide your wiper quickly over the joint without danger of cutting and tearing. One tear ruins wiping action... no tears, and you get clean pipe for miles of trips. Ask your Patterson-Ballagh man to demonstrate!

Specify
PATTERSON-BALLAGH
"Best Bet Yet"
PIPE WIPERS

210 Post Street · 1900 E. 65th St. · 1506 Maury St. · 92 Liberty St.
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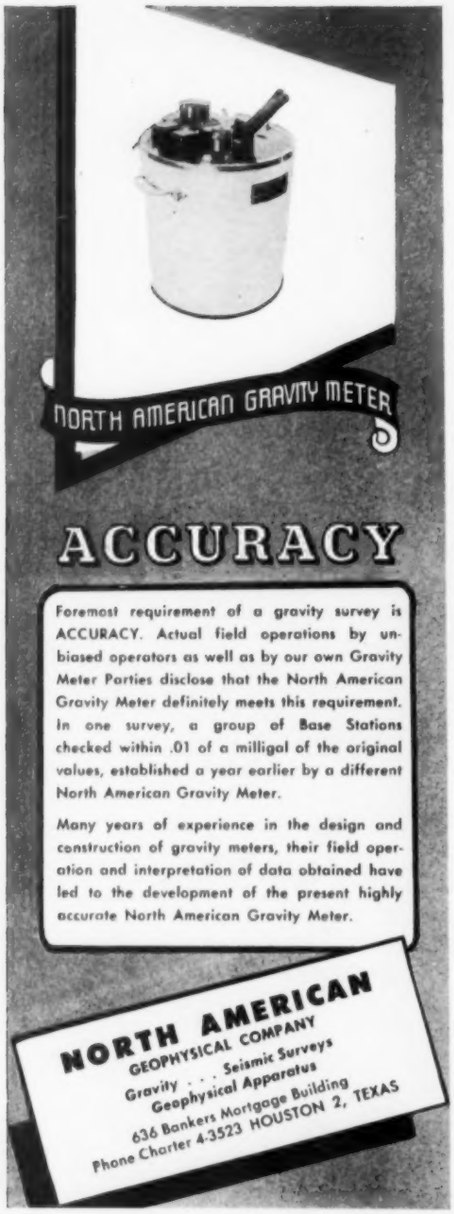
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ACCURACY
Foremost requirement of a gravity survey is ACCURACY. Actual field operations by unbiased operators as well as by our own Gravity Meter Parties disclose that the North American Gravity Meter definitely meets this requirement. In one survey, a group of Base Stations checked within .01 of a milligal of the original values, established a year earlier by a different North American Gravity Meter.
Many years of experience in the design and construction of gravity meters, their field operation and interpretation of data obtained have led to the development of the present highly accurate North American Gravity Meter.
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Houdrane, A New Paraffin Hydrocarbon

A NEW paraffin hydrocarbon, of the empirical formula $C_{16}H_{34}$, has been discovered and named houdrane in honor of Eugene J. Houdry, president of Houdry Process Corporation.

It was analyzed by the hydrogen lamp method and was found to have 15.11 ± 0.3% hydrogen and gave a H/Cratio equal to 2.120 ± 0.005, as against the theoretical figures of 15.137% and 2.125 respectively. Its structure is not definitely established, but it is a highly branched hexadecane having about as many carbon atoms in its branches as it has in the main chain. Of the over 50,000 possible isomeric hexadecanes only a very few are known. None of them have properties identical with houdrane. The best known hexadecane is the normal hydrocarbon or cetane.

Houdrane shows appreciable difference in its properties from cetane. An important difference is that whereas cetane solidifies at + 18.1°C., houdrane remains liquid way below O°C. and solidifies to have a glass only as about -78°C. The boiling point at atmospheric pressure is approximately 40°C. lower than that of cetane.

Horton Floating Roof Booklet

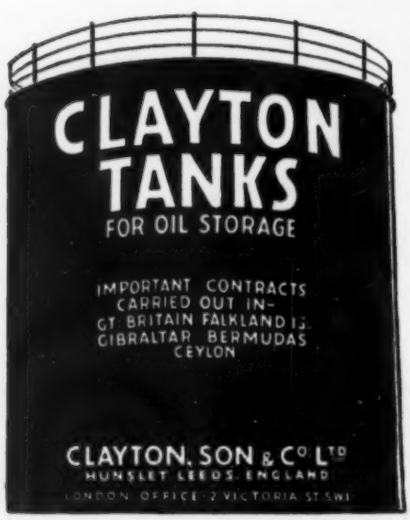
THE CHICAGO BRIDGE AND IRON COMPANY, Chicago, Illinois, announces the publication of a new 12-page booklet "The Horton Floating Roof" discussing the reduction of evaporation loss and the elimination of fire hazard in flat-bottom tanks storing volatile liquids and chemicals.

Included in this booklet is an explanation of the insulating effect of the double-deck on a Horton floating roof in eliminating practically all boiling, thus extending the range of products previously stored in floating roof tanks. Several sketches show the details of the new Horton seal which closes the space between the shell and the deck of the roof. The sealing ring forming a long sliding contact with the tank shell is also shown in these sketches.

Gauging methods employed with flat-bottom tanks equipped with the improved Horton Floating Roof are described and a diagram of a typical installation is shown. A copy of this booklet in English will be sent on request.

New Petroleum Register

OIL company properties and personel throughout the world are listed in the newly published 24th edition of the Petroleum Register. The current volume consists of 600 pages in 19 sections. It is the most complete volume available anywhere. Orders may be placed with World Petroleum, 2 West 45th St., New York 19, N. Y.; or World Petroleum Georgian House, St. James, London, S. W. 1.



E-C INCLINOMETER
Gives a True Record

Correct recording with any inclinometer can be only obtained when the pendulum is AT REST.

NOT THIS

BUT THIS

The E-C Inclinometer is self-checking, making records only when the pendulum is at rest. No timing devices are necessary. It operates automatically as soon as the plumb bob comes to rest for a period of at least one minute. Multiple records can be made during one round trip.

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ACID PLANTS
REDUCE COSTS... INCREASE OUTPUT

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The activated bauxite products of the Porocel Corporation, together with Attapulgus Fullers Earth, offer refiners and chemists a wide range of adsorbent, catalytic and drying agents. They have been used with outstanding success in such processes as catalytic desulfurization, the drying of gases and isomerization feed stocks, the filtering and decolorization of lubricating oils and waxes.

Many research men, working with these specially prepared, low-price products, are finding them useful in improving product quality and cutting costs. It is possible similar tests in your own laboratory will point the way to savings and more efficient methods. We shall be glad to send a generous free sample for testing. There is no obligation. Write for yours today.

POROCEL

A rugged, activated bauxite. Used widely as an adsorbent, catalyst and catalyst carrier. Efficient as a vapor phase desulfurization catalyst. As a carrier, it supports large quantities of many inorganic salts and other compounds. Favored as percolating medium for lubricating oils and waxes. Supplied in various standard meshes, moisture contents and in special low-iron, low-silica grades.

DRIOCEL

Specially selected and activated bauxite with high moisture adsorption specifications. Applicable to most gas and liquid hydrocarbon and other chemical drying processes. Used successfully in drying natural gases, pure hydrocarbon gases, hydrogen, flue gases, feed stocks to isomerization, synthetic rubber, alkylation units and other processes. Supplied in a variety of standard meshes.

FULLERS EARTH

Naturally active and extrusion improved qualities. Standard for many refining and processing operations, including lubricating oil, wax and petrolatum decolorization, Gray Process treating of cracked naphthas, vapor phase desulfurization of natural and straight run gasolines and general oil purification work. Supplied in a variety of mesh and water content specifications.

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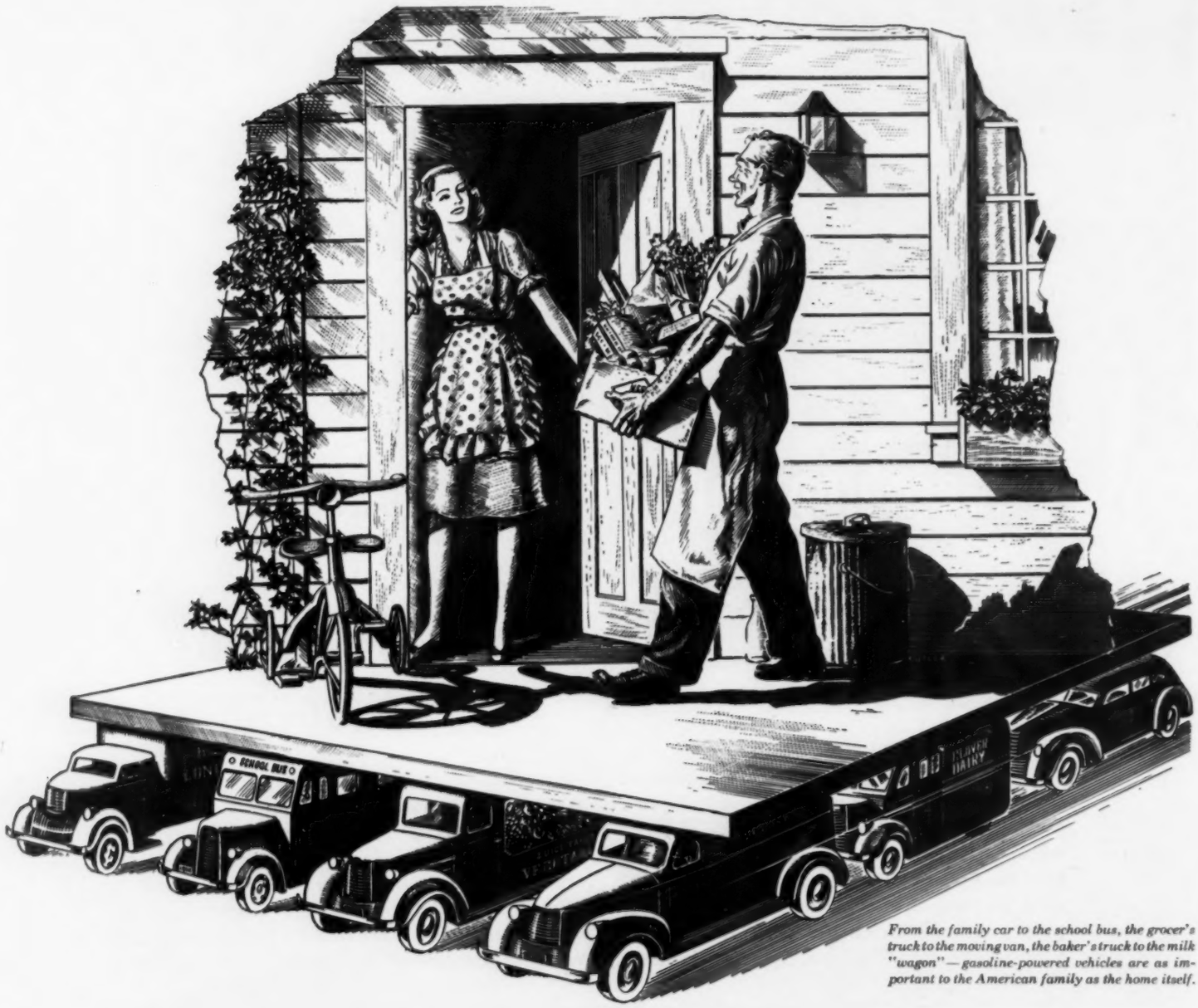

From the family car to the school bus, the grocer's truck to the moving van, the baker's truck to the milk "wagon" — gasoline-powered vehicles are as important to the American family as the home itself.

American homes run on gasoline

MOTOR TRANSPORTATION is so closely woven into the pattern of American living that every man, woman and child benefits when its cost is reduced.

For many years, Ethyl antiknock fluid, used by refiners to improve gasoline, has been of considerable help in the big, overall job of providing more economical transportation. That is because improvements in engine efficiency have depended to a large extent upon higher antiknock gasolines.

Because automobile engines, fuels and lubricants are so closely related to each other in development and use, Ethyl's research and service organizations have always worked closely with both the automotive and the petroleum industries. Today we are expanding those facilities so that in the coming years of progress we shall be able to offer even more assistance to refiners who use our product and to engine builders who are eager to utilize the greater power in improved gasoline. Ethyl Corporation, Chrysler Building, New York 17, N. Y.

More power from every gallon of gasoline through

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OXLEY can tackle it!
"Oxley can tackle it" is correct in the truest sense of the word —we specialise in the entire construction of petrol depots, storage tanks, pipe lines, buildings, etc. The world-wide experience and ingenuity of Oxley is always at the disposal of the petroleum industry.
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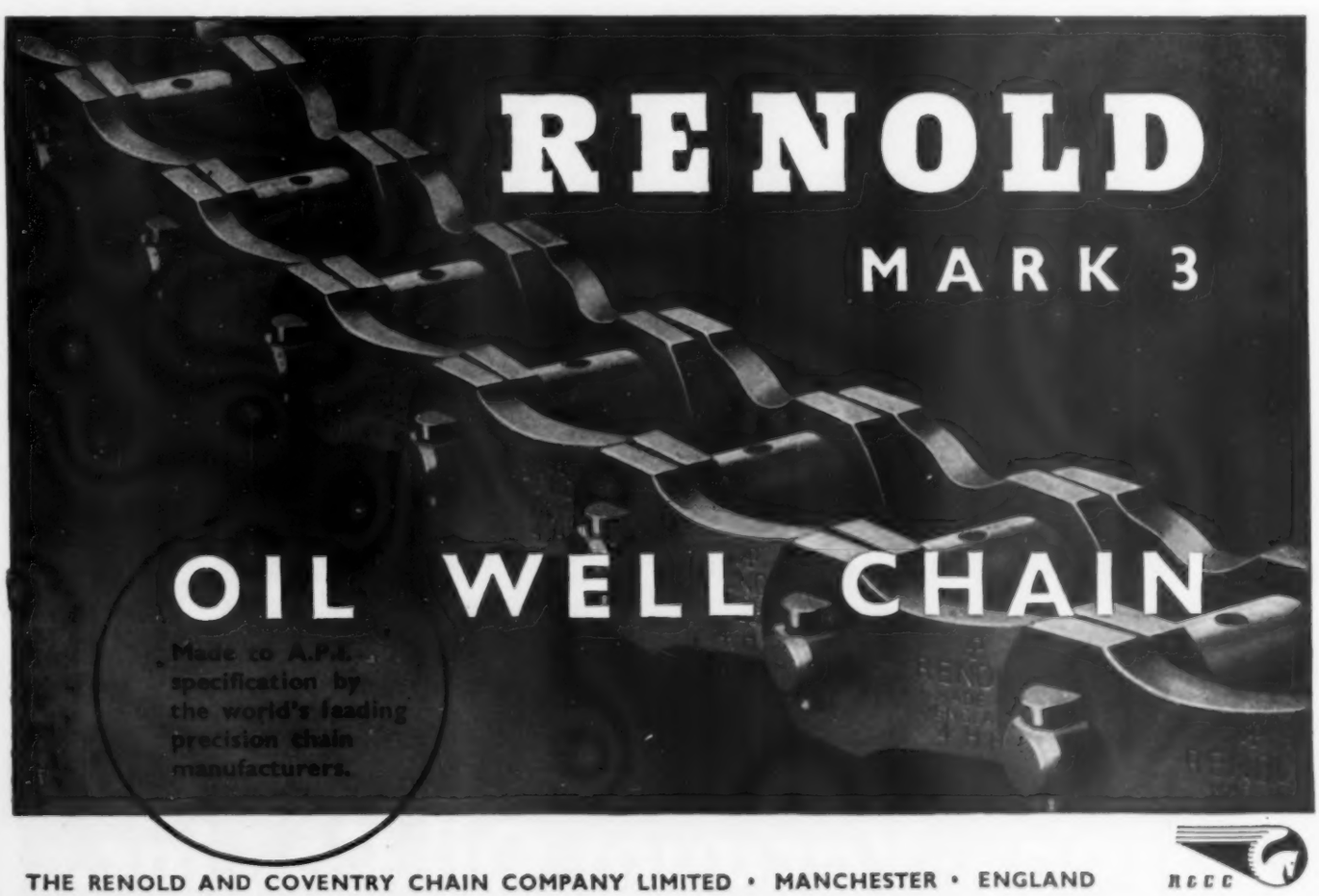

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Now Even Better than Ever Before!

NEW **Mobilgas**

Gives Flying Horsepower!

NEW **Mobiloil**

Keeps Engines Mobiloil Clean!

FAMOUS BRAND NAMES
Backed by 80 Years of Petroleum Experience!

SOCONY-VACUUM

Socony-Vacuum Oil Co., Inc.

and Affiliates: Magnolia Petroleum Co., General Petroleum Corporation of Calif.

SELECT A GUIBERSON TYPE "K" PACKER

FOR THE ROUGHEST TOUGHEST WELLS

Type "KV-10" Control-Head Packer

Type "KVR" Control-Head Packer

Type "K" Packer

Type "KAV" Control-Head Anchor Packer

Type "KA" Anchor Packer

Guiberson's versatile line of Type "K" Packers have proved themselves in hundreds of difficult packer applications against extremely high gas pressures . . . in deep wells . . . in heavy mud . . . in acidizing . . . in the heaviest and the most hazardous field conditions to be encountered. Choose from five individual types of "K" Packers to meet your requirements: both hook-wall and anchor types—with and without control-head valves. Each Guiberson "K" Packer is a precision-made tool of rugged construction. Of simple design, working parts are machined to close tolerance.

The "K" packing medium is a special oil-resistant, acid-resistant sleeve . . . extra-long, extra-thick, with heavily reinforced ends. Of molded composition, it's built for a long life of rough usage, assuring positive pack-off.

Universal in their range of applications, Guiberson's Type "K" Packers are built for loads equivalent to 20,000 feet of 2½" upset tubing . . . available for casing sizes from 5½" to 7⅝" in diameter. There's a Guiberson Type "K" Packer for your well.

GUIBERSON — WHEN WE SAY IT'S GOOD, IT'S BETTER THAN GOOD

Reg. U. S. Pat. Off.

Guiberson U. S. A.

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A. J. SMITH CORPORATION of Kansas City, has purchased the 53-year-old industry manufacturing firm, Black Sivalls & Bryson, Inc. A. J. Smith has been elected president to succeed the founder, A. H. Black, who will remain with the company as chairman. No other personnel changes were made. The company will remain separate from the A. J. Smith Engineering Co.

Black, Sivalls & Bryson manufactured wooden tanks exclusively until 1918 when Perfection Metals Products Company was bought. The company now has steel fabricating plants at Kansas City and Oklahoma City. Wood tanks are made at six plants. Sale of the company involved about $7 millions.

MICHAEL HALPERN, vice president of The Texas Co. in charge of the refining department, and Richard L. Saunders, vice president in charge of domestic sales, have been elected directors. Mr. Halpern joined the company in 1916 as an assistant civil engineer at the Bayonne terminal and later worked in various refineries. Mr. Saunders started in 1909 as a voucher clerk in the New York office.

Mr. Halpern was born in New York City in 1892 and was graduated from New York University with a degree in Civil Enginering. In 1930 he was made assistant manager of the refining department and director of research. In 1937 he was appointed manager of manufacturing and in 1938 general manager. He was elected a vice president in 1940.

Mr. Saunders began working for the company when he was 17. He was assistant general sales manager in 1938 when he was elected secretary of the company. In 1944 he was elected vice president as well as secretary. He resigned as secretary in August, 1945, to become vice president in charge of domestic sales.

FRANK M. PORTER, president of the Fain-Porter Drilling Company of Oklahoma City, Oklahoma, was elected president of the Mid-Continent Oil and Gas Association at its recent 28th annual meeting. Elevated from his former position as president of the Oklahoma-Kansas Division of the Association, he succeeded the late Judge J. C. Hunter of Abilene, Texas. Mr. Porter was born in Brooklyn, New York in 1892. He entered the oil business with the Dundee Petroleum Company at Ardmore, Oklahoma in 1916 and spent two years in the field and general offices. In 1918 the Roxana Petroleum Company, now the Shell Oil Company, bought out the Dundee Company.

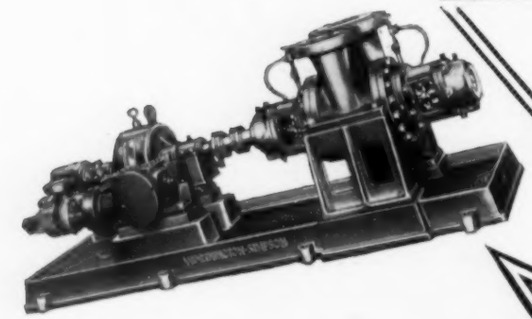
When the Wirt Franklin Petroleum Corporation was organized in 1927, he became vice president in charge of production. He was receiver from 1933 to 1939, and when the receivership was removed in 1939, Mr Porter served as general manager until 1942 when the corporation was sold. In 1939 he entered into partnership with Leslie Fain in the Fain-Porter Drilling Company. When Leslie Fain died suddenly, two years ago, Mr. Porter liquidated part of the organization and is now sole owner of the company with several rotary drilling rigs.

Mr. Porter served two terms as president of the Oklahoma-Kansas division of the Mid-Continent Oil and Gas Association. He has been active in various capacities in the American Association of Oil Well Drilling Contractors. Since 1941 he has been a resident of Oklahoma City.

Van Campen to New York

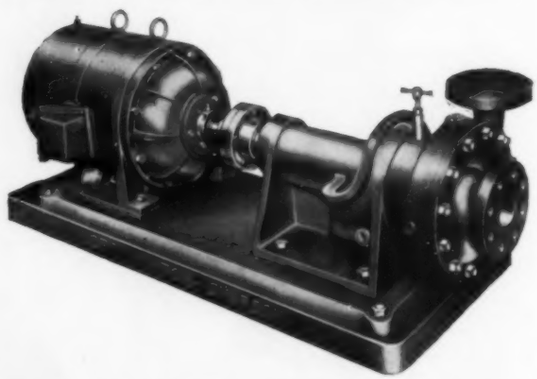
AVERY VAN CAMPEN, for the past ten years employed by Clark Bros. Co., Inc. in their experimental, engineering and sales departments at Olean, New York, has been appointed to their New York City sales office as district engineer. For the past three years, Mr. Van Campen has been job engineer on a National Defense Research Committee contract at Clark Bros. Company in Olean.

WORTHINGTON—SIMPSON



PUMPS FOR

REFINERY SERVICE



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★ This sectioned illustration of a flanged Newman-Milliken Valve shows the cylindrical plug and lubricant ducts which seal the valve against leakage and ensure easy operation at all times. A rectangular port valve is shown, but full round port valves are also manufactured.

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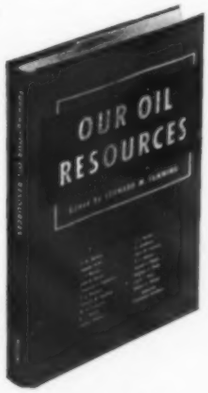

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LT. COLONEL DICK HOLT, Army Air Forces, former sales supervisor of tires, batteries, and auto supplies, has recently returned to Tide Water Association Oil Co. He has been awarded the Bronze Star, Unit Citation, and the Belgian Fourragére for Meritorious achievement in the line of duty.

WILLIAM C. LANE has been reelected president of the California Commercial Co., Inc., subsidiary of the Standard Oil Co. of California. Offices of this subsidiary are in New York. Lane has been serving as Lieutenant Commander in the Navy for the past three years, largely in London as officer in charge of the fuel and tanker control section in Europe.

New Type Report

OIL companies have adopted various methods of making their reports more understandable and interesting to employes, stockholders and the public. A striking innovation in this direction was introduced by S. J. Dickey, president of General Petroleum Corporation of California. He utilized the radio for a 15-minute broadcast over a Pacific Coast network, presenting a management report on the operations of the company.

Included in the report was the announcement of additional increases in pay to employes in conjunction with the return to a normal 40-hour week. Mr. Dickey also stated that the number of employes was 30 per cent larger than at the start of the war. He lauded the achievement of the workers during the war and said: "The interests of employes and stockholders in the success of the company are identical. The increase in costs of wages and materials and the present limitations on price adjustments for products call for renewed intelligent exertion and effort on the part of every individual."

S. J. DICKEY

J. H. GRAHAM has been appointed assistant manager of Continental Oil Company's production and drilling department east of the Rocky Mountains. He will direct producing unitizations in all regions and help expand market outlets for natural gas. He will maintain headquarters at Houston. Mr. Graham joined Continental in October 1945. Previously he was an independent oil operator and district director of the natural gas and natural gasoline division of the PAW at Houston.

Opens London Offices

Harold F. Towler has been appointed United Kingdom representative of Byron Jackson Co. and International Cementers, Inc. He will maintain offices at 9 Cavendish Square, London. Mr. Towler has been in India and Burma for the past 25 years with the Burmah Oil Co. He was co-developer of "Directional Wireless" which later was perfected as the radio beam for guiding aircraft. He was a naval aviator in World War I and became an authority on aerial navigation.

C. P. BOWIE, supervising engineer of the San Francisco office of the Bureau of Mines, has retired after 30 years with the bureau. He will take an extended vacation in the mountains and next fall plans to engage in oil consulting work. His headquarters will be at San Francisco.

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On your next job—call in the Lane-Wells representative and discuss with him the selection of the bullet to get the best results.

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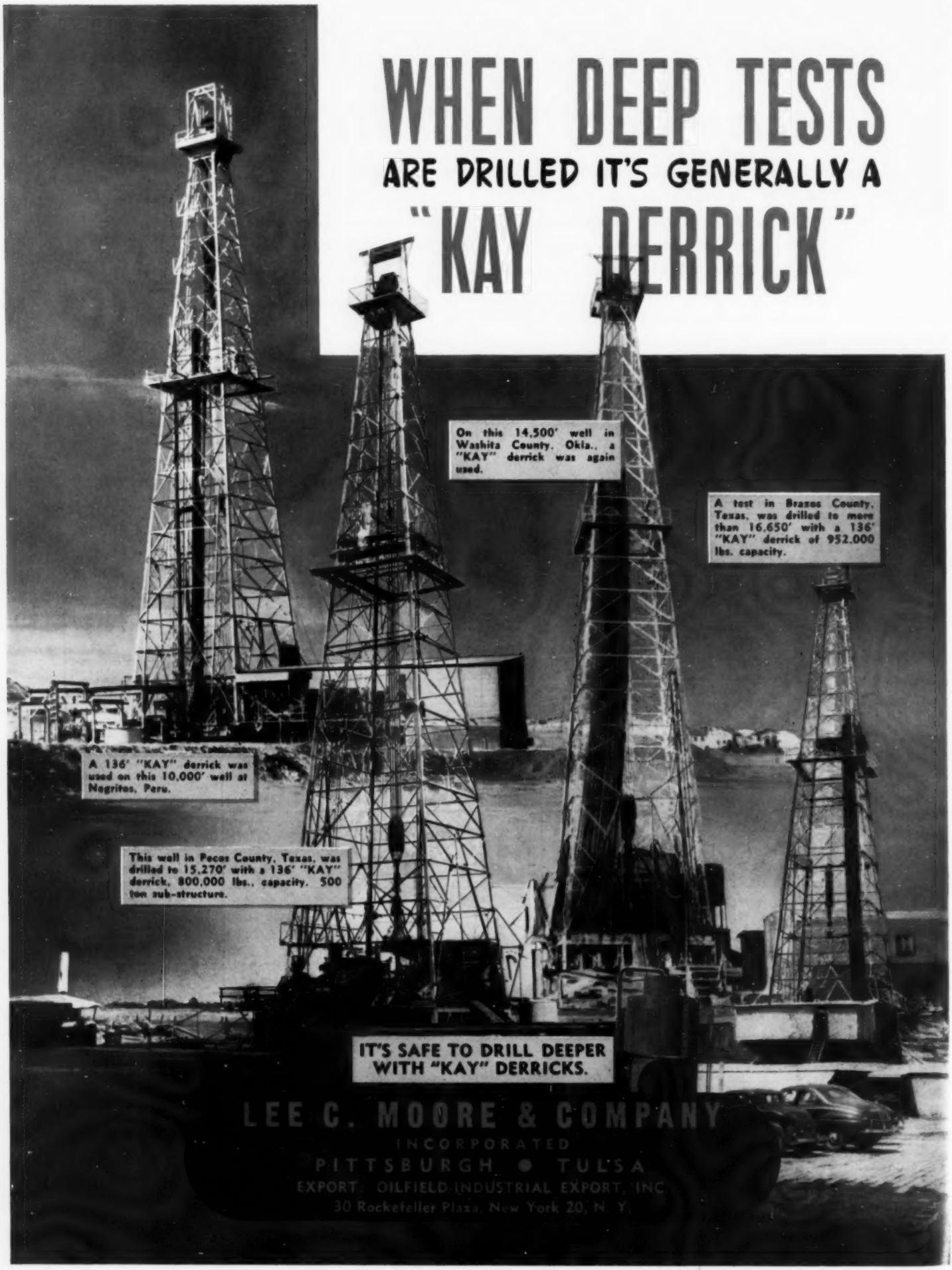
BULLET TYPE		SIZES AVAILABLE	TYPICAL PERFORATION CHARACTERISTICS (1)		GIVES	USED FOR
NUMBER	NAME		BURR	HOLE DIA		
1	STEELFLO	1/4" 3/8" 15/32" 9/16"		1/4" 3/8" 15/32" 9/16"	Maximum penetration. Improved cutted head burr. Streamlined point structure. Flight stability.	Deep formation penetration.
2	BURRFREE	1/4" 3/8" 15/32" 9/16"		1/4" 3/8" 15/32" 9/16"	Elimination of burr. Less penetration than Steelflo. Otherwise possesses all advantages of Steelflo above.	All jobs where smooth bore surface of pipe is necessary and penetration is of secondary importance.
3	SEMI-MUSHROOM	15/32" 9/16"		9/16" 5/8" (2)	Hole in casing larger than bullet. Considerable scar contact fracturing. Reduced penetration.	Casing removal. Cement fracturing.
4	FULL MUSHROOM	15/32" 9/16"		5/8" 7/8" (2)	Hole in casing considerably larger than bullet. Extensive scar contact fracturing. Considerably reduced penetration.	Casing removal. Cement fracturing.
5	NEEDLE	1/16" 1/8"		1/16" 1/8"	Single string tubing penetration.	Establishing circulation in stuck tubing or any other purpose where small orifice is desired.
6	PUNCH	15/32" 9/16"		15/32" 9/16"	Negligible burr. Controlled penetration. Hole same size as bullet.	Perforation of the inner of two strings without damage to outer.

(1) Based on observation of tests in J55 casing. (2) Dependent upon casing thickness and cement support.

Most of the bullet types and sizes illustrated are on hand at Lane-Wells Branches or can be obtained on reasonable advance notice.

WHEN DEEP TESTS
ARE DRILLED IT'S GENERALLY A
"KAY DERRICK"


On this 14,500' well in Washita County, Okla., a "KAY" derrick was again used.
A test in Brazos County, Texas, was drilled to more than 16,650' with a 136' "KAY" derrick of 952,000 lbs. capacity.
A 136' "KAY" derrick was used on this 10,000' well at Negritos, Peru.
This well in Pecos County, Texas, was drilled to 15,270' with a 136' "KAY" derrick, 800,000 lbs., capacity. 500 ton sub-structure.

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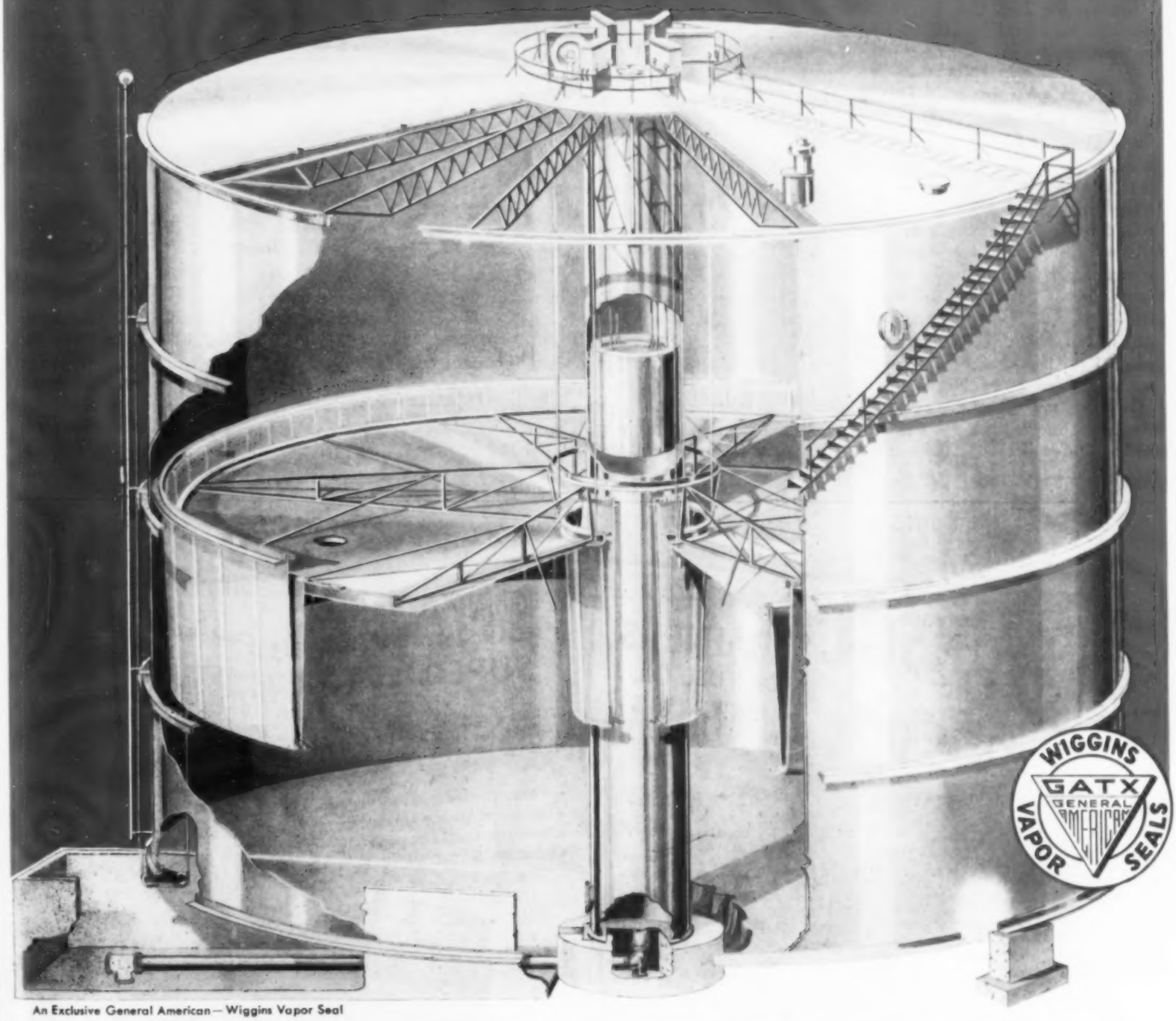

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Big Inch Fate in Suspense

The Federal Power Commission is entertaining two applications for certificates of convenience and necessity in connection with offers made to the War Assets Corporation for the purchase of the Big Inch and the Little Big Inch pipe lines. Trans-Continental Gas Pipe Line Company of Longview, Texas, has offered $40,000,000 for the two lines and the Southwest Emergency Pipe Line, which extends from Refugio to Houston. Big Inch Gas, Inc., a Delaware corporation, has offered $40,000,000 for the Big Inch alone.

Trans-Continental plans to spend $80,000,000 for purchase and conversion of the lines. In the event WAC rejects the purchase offer, the company wants FPC to grant a certificate for it to build and operate a similar gas transportation system to cost $80,000,000. Meantime, WAC is casting around for some way of having the lines operated for transportation of oil, as was recommended by it predecessor, Surplus Property Administration.

WAC probably will not complete any deal for disposal of the lines without Congressional approval. In view of the interest taken in the lines by Congress, any proposed deal would undoubtedly be submitted to the Senate Special Oil Investigating Committee (O'Mahoney) and the House Committee on Expenditures in Executive Departments. The latter is planning to hold hearings on disposal of the lines in the near future.

Defends Oil Pact

Chances of the Anglo-American oil pact getting before the Senate for ratification this year appear about nil. The treaty now is pigeonholed in the Senate Foreign Relations Committee to which it was referred some months ago and the prospect of the Committee's starting hearings on it any time before election is decidely not bright.

Committee Chairman Tom Connally of Texas is up for re-election, and the oil pact is an explosive question in the Lone Star state, from which violent opposition to the treaty stems. Connally naturally doesn't want the issue to come up and be injected into his electioneering this fall. But, in spite of the opposition and the delays that have kept the treaty hanging fire in the Foreign Relations Committee, proponents of the pact are determined that it shall not be sabotaged. Acting Petroleum Administrator Ralph Davies says:

"The Anglo-American petroleum agreement was very carefully drawn on the basis of extensive consultation with industry and with interested government departments. The Petroleum Industry Committee on National Oil Policy, representing a cross section of the American oil industry, under the able chairmanship of A. Jacobsen, president of Amerada Petroleum Corporation, devoted weeks and months to this project. The document that has been signed is distinctly favorable to the American oil industry — all branches of it — and, what is more to the point, it advances and protects the interest of the American public.

"An inspired opposition is endeavoring to create fears through erroneously representing that the treaty would open the way to increased American imports at the expense of domestic production. The claim is completely without foundation. No part of the treaty contemplates anything of the kind. To the contrary, the order, stability and international cooperation which is its purpose, will afford the best possible protection against that very thing."

To Gather Oil Fire Statistics

CAPITAL stock fire insurance companies have adopted a new system of gathering statistics on premiums collected and losses paid in the oil industry. Data will be segregated into four divisions: refineries, producing properties, distributing facilities and natural gasoline plants. This latter classification will include repressuring plants, and natural gas and crude pipeline pumping stations.

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Natural Rubber Short

For the rest of 1946 supplies of natural rubber available in this country will be on a hand -to-mouth basis, and according to Everett G. Holt, Department of Commerce rubber advisor, the United States rubber products industry must continue to rely chiefly on the synthetic variety at least until the end of this year. In an outlook report surveying the current years' situation, Holt says the only short-term course the United States can follow is to produce and use as much synthetic rubber as is required until the shortage of the natural variety ends, meanwhile using natural rubber "prudently".

Productive capacity for synthetic rubber is more than ample to meet all demands this year and imports of natural rubber, though increasing, will fall far short of total rubber requirements, he says. The British-Dutch-French Rubber Study Group estimated in November 1945 that approximately 625,000 tons of natural rubber from all sources would be received by consuming countries in 1946. If this figure is reached the United States is expected to obtain up to 300,000 tons by allocation.

Holt believes that declining shipments after 1946 are to be expected from countries that supplied us with natural rubber during the war. Amounts from the Far Eastern countries liberated from Japan will depend on how quickly their completely disrupted economic structures can be restored. Complete rehabilitation, he says, certainly will be a matter of years.

"Among factors favoring speedy resumption of rubber output in these areas," Holt says, "are their need for American exchange with which to purchase desired goods, the fairly satisfactory condition of rubber trees generally reported, and the availability of labor. The substantial damage done to buildings and equipment will not be, in most cases, a limiting factor on production since damage can be repaired as rapidly as production can increase."

These favorable factors, he says, are outweighed heavily by adverse conditions, chief of which is the present political situation. Political disturbances virtually bar the shipment of rubber from Java and Sumatra and retard the movement of stocks from the interior, of these countries and Indo-China to ports of shipment. Rehabilitation and production on rubber estates in these countries are likewise being delayed by these same conditions.

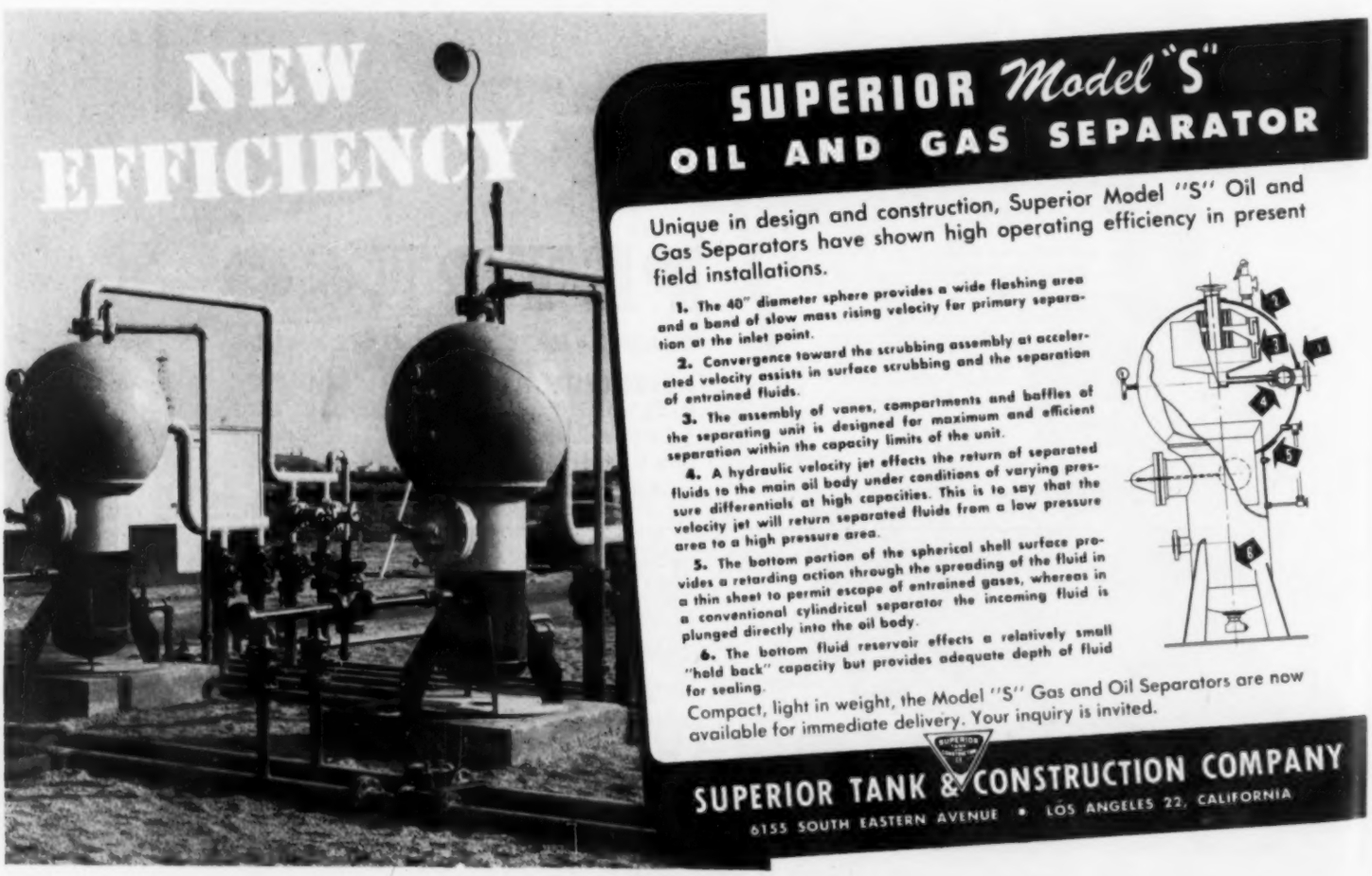
JOHN F. LOCK, assistant to the president, Sinclair Petroleum Company, is enroute to Addis Ababa, where he will conduct exploratory work under the agreement made with the Ethiopian government for the development of the petroleum concession granted Sinclair.

Mr. Lock, who received his A. B. in Geology from the Texas Technological College, has recently returned from three years' active service with the Marine Corps in the South Pacific. He was awarded the Purple Heart and his unit received a presidential citation. Prior to his enlistment in the Marine Corp he was employed by Sinclair as field geologist in the Gulf Coast area.

Hauser Made District Manager

A. R. HAUSER succeeds the late John McClain as joint district manager of Clark Bros. Co., Inc. and Pacific Pumps, Inc. Chicago offices. Mr. McClain died last September at his summer home at Knox, Ind. Mr. Hauser comes to his new duties after ten years of engineering service in the engineering department of Pacific Pumps. During his last three years with the company, he served in the capacity of assistant chief engineer.

JOHN LICATA has been appointed manager of the special products division of Standard of California's marketing department. He will have charge of marketing thinners, solvents, liquefied petroleum gas, white oils, fly spray and other special products.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5. The bottom portion of the spherical shell surface provides a retarding action through the spreading of the fluid in a thin sheet to permit escape of entrained gases, whereas in a conventional cylindrical separator the incoming fluid is plunged directly into the oil body.
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Premium Motor Oils

By C. M. Larson*

WHILE today's straight mineral motor oils are generally of higher quality than ever before, operating conditions and practices in many cases are too severe for straight mineral or "regular" motor oils to withstand the resistance to oxidation. Such oxidized oils form harmful engine deposits and corrode alloy bearings in the engine. An important influence encouraging rapid oil oxidation is high temperature operation.

Up until 1939 the oil industry felt that internal combustion engines should operate satisfactorily on straight mineral oils without the use of additional agents. If difficulty did arise it was ascribed to faulty engine design. However, it was soon recognized that some commercial high-output engines which could not be operated under severe service conditions on straight mineral oils would function entirely satisfactorily even under the most severely sustained service conditions on oils containing suitable chemical additives. Such oils are now called heavy duty oils.

The oil technicians set out to develop a new trend in motor oil performance but the start of the war prevented the motoring public from enjoying these modern advancements in motor oils which were greatly enhanced through the use of additives. Such additives were used in large proportions by the armed forces in heavy duty motor oils for all ground equipment. Out of the war experience has come a new standard of motor oil quality. This standard is designated "premium motor oil" by the Lubricating Committee, API Division of Marketing.

"Premium motor oil" is an oil having proved oxidation-stability and bearing-corrosion preventive properties. Whether this "premiuum motor oil" contains an oxidation inhibitor only, or an oxidation inhibitor plus a detergent-dispersant compound, depends on the marketer's viewpoint with respect to the varieties of additives needed for the type of base oil used and the standard he sets up as "premium motor oil"

All "premium" grade motor oils will contain additives and these will average out between one- and one-half to four percent. About 50 percent of this year's sales will probably swing to "premium" grade whereas the heavy duty additive type will be approximately 10 percent of the motor oil volume based on American consumption in passenger cars, trucks, buses and tractors.

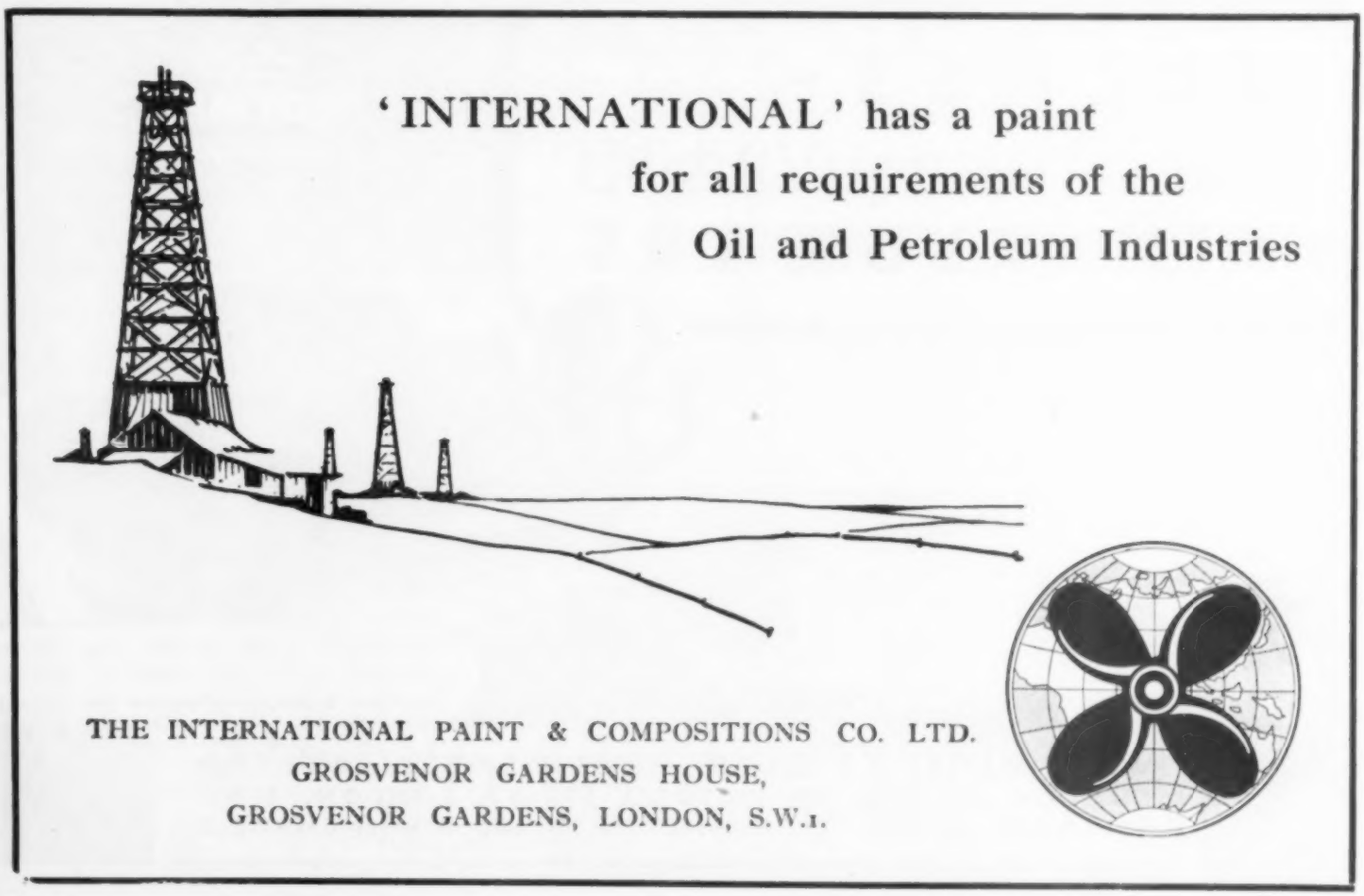
Such additives cost money as the chemical addition agents run from $1.50 to $2.50 per gallon. A fair estimate of the cost of additives for premium grade motor oils during 1946 is better than $6,000,000. Some estimates place a future annual market for "additive" substances to improve lubricating oils at one-hundred-million dollars within the next three to five years. This looks like six times what is actually required for motor oils. However, regardless of the expense to the oil industry through extensive research, engine testing and chemical additive costs, the motorist, truck and bus operator and tractor owner will benefit greatly.

Such "premium" motor oils make for cleaner engines and a cleaner engine gives better road and operating performance and prolongs engine life. The "premium" motor oils are being recommended for better performance in the instruction books of the 1946 cars.

*Chief Consulting Engineer, Sinclair Refining

H. S. Brown Elected Chairman

DIRECTORS of Foster Wheeler Corp. have elected H. S. Brown as chairman of the board to succeed his brother, the late J. J. Brown. Mr. Brown will continue as president of the corporation in addition to his new post. David McCulloch, executive vice-president, was named chairman of the executive committee to succeed H. S. Brown. All other officers were re-elected.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Expanding Oil Facilities in Bolivia

(*Continued from page* 51)

topping plant will be installed during the first period of operation of the pipeline. It is estimated that the total utilities from production, transportation, refining and distribution through the processing of crude from Camiri in this topping plant, will have a value of over eighty million bolivianos per year.

The cost of the refinery will be approximately $200,000. It will be located in the city of Cochabamba and not at the terminal of the pipeline, as this location offers several advantages such as lower cost of crude transportation in relation to the products refined. Its installations will also serve for the large refinery projected to provide gas for the city of Cochabamba and the cost of installation will be lower in this place.

Having determined upon a pipeline as the first means of transporting the crude from Camiri to the Altiplano, YPFB had to find the solution to two different problems. (a) Selection of the most desirable route from a technical and economic standpoint. (b) Exact cost and means for financing the work.

Prior to the engagement of Williams Brothers Co., YPFB had signed a contract with the engineer Raul Canedo Reyes for the study of a project for a pipeline starting at Camiri and having its terminal in Sucre. Canedo Reyes made a complete survey of possible routes for this pipeline and according to his report the most adequate route was Camiri, Monteagudo, Bohorquez, Zudanes, Sucre. The national consumption of petroleum products being approximately 120,000 cubic meters per year, and considering that this consumption would increase at an average of 10 percent per year as a minimum, and that the life of the pipeline should be estimated at at least twenty years, the project provided for a capacity of 3,000, 6,000 and 12,000 daily barrels increasing with the number and horsepower of the pumping units.

Meanwhile, the Technical Department of YPFB in charge of Eng. Miguel Angel Roca, at La Paz, was making studies in relation to the distribution of oil products. As a result, it was decided that the most convenient terminal for the pipeline would be the city of Cochabamba and, consequently, this city should also be the site selected for the refinery. It was also decided that due to the location of oil markets in the Republic an adequate solution would be the erection of two refineries, one in Sucre to supply the southern market and one in Cochabamba to supply the northern section.

While the calculations indicated a savings in costs of approximately six million bolivianos per year, in favor of one refinery at Cochabamba, nevertheless, with a possible total profit of 80,-000,00 bolivianos per year and the prospective increase in consumption in the Sucre area through the construction of a railroad line to Boyuibe, YPFB believed it would be desirable eventually to install another topping plant at Sucre.

These considerations, plus the fact that the study of the Camiri-Sucre route indicated that a pipeline along this route would go across zones of greater resources than one following the northern route through Rio Grande to Cochabamba, that the distance along both routes would be practically the same, that great savings of time would be obtained by laying the pipeline near the main road Sucre-Camiri, and that the costs by both routes would be similar, led to the selection of the route Camiri-Alcala-Zudanes-TinTin-Cochabamba. When the plans for the construction of this pipeline were made and its total cost estimated, excluding the last section TinTin-Cochabamba, the total amount estimated was $5,159,-040 including a profit of 4 percent for the contractors, without taking into consideration the cost of the installation required for loading four tank cars simultaneously, that has been estimated in $50,000.

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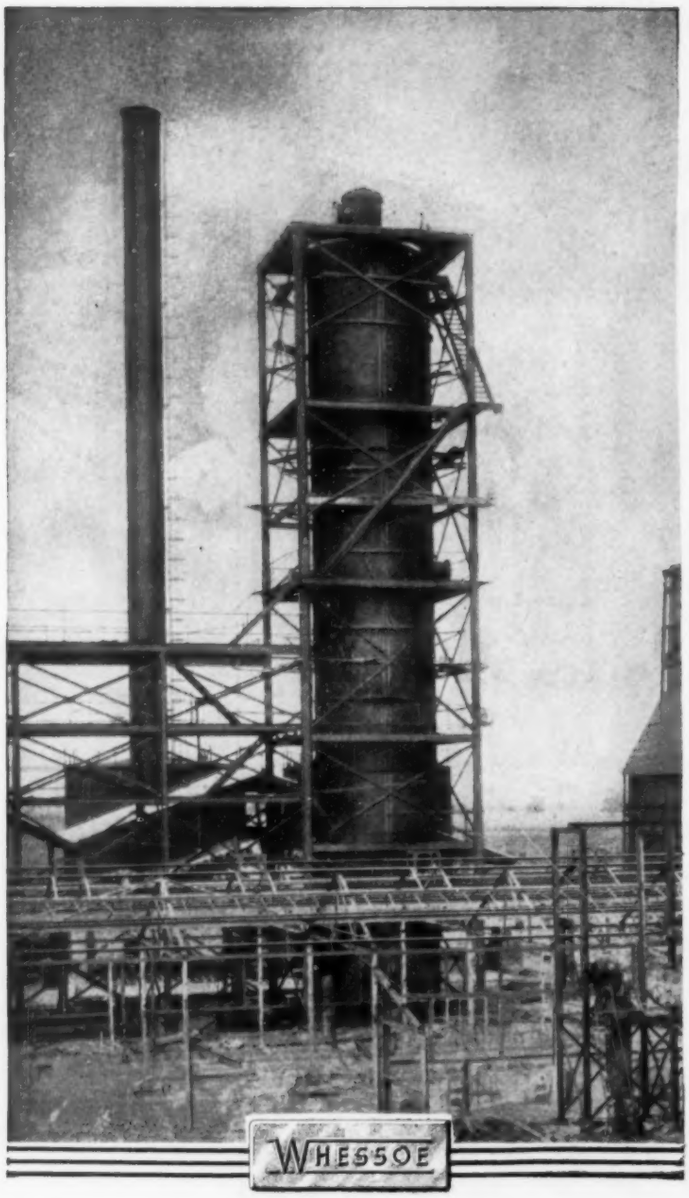

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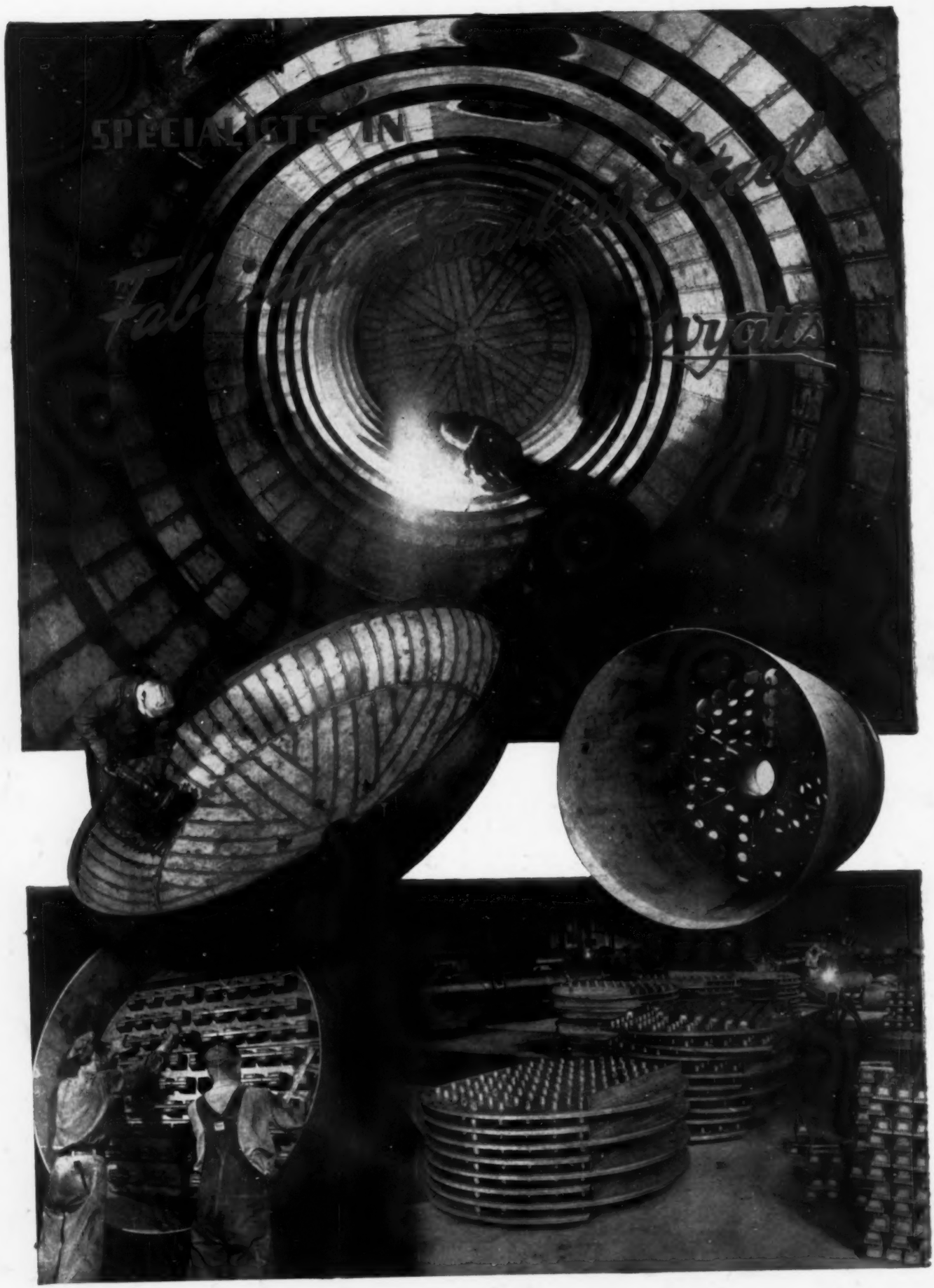
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